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The Farmer's Digest

Volume 11 July, 1947 Number 3

Pasture-Silage — Quality Feed

Condensed from Guernsey Breeders' Journal

H. P. Ewalt

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With the dust bowl era, there was born the phrase "grassland farming." The type of agriculture typified by this phrase is and will continue to be the bulwark upon which sound agriculture will develop. Within the past 10 years, the acreage of improved pastures, both dryland and irrigated, has increased tremendously. Dairy farmers put their best land in pasture, where some years ago pastures were relegated to the poorer soils. This wider use of pasture proved its value to many dairymen in war years when grain was costly and high protein feeds were scarce. Those with good pastures were in a much better position to maintain high production.

The West, particularly the Pacific Northwest, has long been envied for its natural pastures, but even here improved seedings of grasses and legumes adequately fertilized have proved their worth. At the Oregon Experiment Station, irrigated pastures of Ladino clover and perennial ryegrass have given seven months of pasture and produced as much as 40 tons of green forage per acre for the season. Five-year-average yields of 25 tons per acre on the same pasture are not uncommon.

This kind of pasture plus poor haying weather three years out of five has given importance to the grass silage program.

Modern machinery and methods have brought to the dairymen a means of preserving some of the value that pasture has as a milk producer. The most successful dairymen in the future will be the ones who recognize the value of cheap high-quality roughage. This begins with good pasture and is followed by high-

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quality silage made from clover and grass, grass alone, or from alfalfa and other forage normally used for hay. These crops should be harvested and preserved during the stage at which they make the best grazing. The nearer they are to this stage when cut, the more food value they will have and the higher the net return will be.

Some dairymen are using grass silage entirely as a roughage in winter feeding. Many find that cows will consume 50 to 70 pounds more daily. Significant is the fact that dairymen are using this higher quality, cheaper roughage to replace 50 to 75 per cent of the hay formerly fed and with better results at the milk-pail.

Advantages

1. Part of early pasture may be grazed and part used for silage for late summer and winter feed.

2. Crops that are ready to harvest when haying weather does not prevail can be saved and with a higher feed value.

3. Forage may be harvested earlier and the second crop have advantage of more moisture.

4. More protein may be saved per acre.

5. Silage retains more vitamin A than other methods of storage.

6. Greater palatability may be obtained.

7. On many farms, ensilage may be the cheapest method of storing roughage.

8. It fits into the pasture program.

9. The crop can be *harvested and stored with no hand labor,* and two men alone can do the job. The same equipment with no additions can be used for the entire hay harvest.

10. More nutrients per acre of crop can be saved by the method.

Stage of Growth of Harvest

Many dairymen have overlooked the value of quality in their roughage program. Those dairymen who have been using grass silage for five or six years state that each year they try to get the forage in at a more immature stage. Grasses are best cut before they bloom and preferably when the heads begin to show. Oats and other cereals may best be ensilaged when the grain is in the milk or very early dough stage. Clover, alfalfa, and most legumes are cut in the early bloom stage.

Moisture content of the material ensiled is one of the most important factors determining the palatability and feed value of the silage. Seventy per cent moisture is about the most de-

sirable. Field checks over the past several years indicate that in many instances, the forage was too mature and too dry. These two factors must be carefully controlled for the best possible results. If the crop is at the right stage of maturity, it will need to lose just a little moisture before going into the silo. This can be accomplished by waiting for two hours on a good drying day and one-half day or longer on a very slow drying day. The careful operator making good silage will cut the field a part at a time so that if the forage becomes too dry, it may be mixed load for load with fresh cut forage. While moisture determiners are available, practice and experience cannot be excelled as guides in good silage making.

While top quality silage can be made by the wilting method, the use of a preservative is always good insurance. Most of the feed value of these preservatives is retained in the silage. Molasses is the first choice and should be used liberally. Those dairymen who have been making silage for a number of years recognize the feed value of molasses alone and also as a standard safeguard against having an unpalatable silage, particularly when all conditions cannot be controlled as we know they should be.

Whole or ground grain (wheat, oats, barley, or corn) have been used very successfully. Chopped hay of good quality may be added when excess moisture conditions prevail.

Preservative per Ton of Silage

Crop	Molasses (lbs.)	Ground or Whole Grain (lbs.)
Legumes	60 - 100	150 - 250
Legumes and Grass	40 - 80	125 - 175
Grasses and Cereals	30 - 40	75 - 125

The addition of molasses is best done by use of a rotary gear pump and one and one-half inch fire hose or pipe direct from the pump to the top of the silo where the molasses is mixed with the forage at the elbow. The pump should be located at or below the bottom of the molasses supply and connected to it by a two-inch suction pipe as closely coupled as possible. A by-pass valve is provided to regulate the flow. The pump must run at a slow speed. With this set up, pure molasses at 55° F. can be successfully pumped.

Ultimately, only one method of harvest—the field cutter with trailers—will probably be used. However, until equipment is readily available and while dairymen still have some pieces of harvesting equipment already on hand, various combinations will be in use. Four basic methods are as follows: 1. Mowing, rak-

ing, hand loading and unloading. 2. Mowing, raking, or swathing, machine loading, hand unloading and feeding to a stationary chopper. 3. Mowing and swathing, pick up with field chopper, unloading to blower mechanically. 4. Direct cut with field chopper and mechanical unloading to a blower.

One of the most experienced grass silage makers in northwestern Oregon is Art Johnson, of Astoria, who filled 19 silos last year—three of his own and 16 for neighbors. Johnson has been using grass silage for years and until 1945 he put it up the hard way by hauling the mowed grass to the silo where it was run through a stationary ensilage cutter. In 1945 he hired his silo-filling done by a man who owned a field chopper, and he liked the results so well that in 1946 he invested in a complete outfit—field chopper, three specially equipped wagons, blower, and molasses pump. Since both equipment and labor were scarce and the demand for silo-filling was booming, Johnson went into the business of custom silo-filling as a sideline to the operation of his 50-cow dairy herd.

Using only two high school boys plus his own labor, he filled 19 silos for 12 people and gained a great deal of practical experience in the technique of doing custom work. This year, he will charge $2.00 per ton to put the crop from the windrow into the silo. The customer is responsible for mowing and windrowing the crop, installing the blower pipe (Johnson has two and supplies one in advance), furnishing the molasses, and tramping the ensilage and closing the silo doors.

Silo-filling is no short-season job in this area Johnson found. He started filling last year on the 17th of May and worked intermittently when weather permitted until mid-August. Even that did not end the year's work for he filled one silo and refilled another in October from a second cutting of grass and legume mixture. This October job gave his molasses pump its severest test for the weather was so cold that the molasses was thick enough to cut with a knife.

The pump which Johnson uses is a gear-pump of the type used in handling heavy fuel oil at canneries. It has a 1¼-inch intake and outlet, and is operated at about 200 revolutions per minute under normal conditions. A two-inch hose feeds molasses from the barrel to the pump, and a 1½-inch discharge pipe leads from the outlet to the firehose that feeds the fluid into the silo.

A novel feature of Johnson's silage unloading outfit is a 1½-

inch electric drill which winds up the canvas apron in the bottom of the trailer to "walk" the load of chopped material into the feed trough of the blower. A gear reduction box with a 48-to-1 ratio transmits the rotary motion of the drill to the shaft at the rear of the trailer on which the canvas apron winds up as the load is pulled out of the vehicle.

In the development of the grass and legume silage program, this fact must be kept in mind. The silage can be no better than the forage put in, and low-quality silage can be made as well as low-quality hay. Highly palatable silage with a relatively high per cent protein can be made of legumes and grasses put in the silo at the stage of growth at which they are most palatable to livestock as a pasture crop.

Way to Get More Protein

Grasses grown with legumes have a higher protein content than when grown alone. At the U. S. D. A Beltsville station, protein content of orchard grass in a Ladino mixture, cut July 25 when it was 5 inches tall, averaged 25.2 per cent as compared with 20.4 per cent when grown alone. The second grass crop, harvested August 22 at the same stage of growth, had a protein content of 20.6 per cent, compared with 17.3 per cent for grass from a straight seeding. Protein in orchard grass in all tests was higher as more legumes were added to the mixture. Content was higher in spring growth. Beltsville tests indicate Ladino may be more effective than alfalfa in increasing protein content of grasses.

Capper's Farmer

How Large Should a Farm Be?

Condensed from Hoard's Dairyman

F. D. Farrell

Several months ago in company with two British farmers who were making a study of farm structures in the United States I visited a 160-acre Kansas farm. The farm owners operate a small, specialized chick hatchery as a sideline to general farming. When we had inspected the attractive farm home and were on the way to the hatchery, the farmer's wife remarked that their orders for chicks greatly exceeded their supply. She said the demand for the kind of chicks they produced seemed to be insatiable. She and her husband, she said, were frequently urged by their friends to expand their hatchery business, but they resolutely refused to do so because, in her words, "while expansion might increase our profits, it certainly would increase our troubles and reduce our enjoyment."

For themselves, this woman and her husband have solved satisfactorily one of the major problems facing American farm people—the problem of deciding how large a farm, a "family size" farm—and a farm business—should be. For many American farmers this problem appears to be far from solution. In the nation as a whole and in many states and counties, the farms are increasing in size and declining in number. This trend has continued for years and it still persists. Between 1890 and 1940, the average size of farm in the United States increased 27 per cent. Almost half the increase occurred during the last ten years of the 50-year period.

What are some of the essential factors to be considered in relation to size of farm? Mention will be made here of only three such factors. There are, of course, others, for the question is an extremely complex one. But the three factors to be mentioned are basic.

First, there is the geographic factor. This involves location, soil, climate, and perhaps other relatively fixed conditions. It influences profoundly the types of farming that are economically and physically feasible in a given location. A type of farming that is feasible on 80-acre farms in an irrigated district may be virtually

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impracticable on farms of such size in the unirrigated areas of the Great Plains. Truck farming may provide a satisfactory livelihood for a family on a small farm near a large city, but be hopeless on a farm of any size in a locality so far removed from a large consuming center as to make transportation costs prohibitive. Many other examples could be given to emphasize the importance of the geographic factor.

A second essential consideration is the human factor. This involves the aptitudes, interests, temperaments, and enthusiasms of the people concerned. Often in the same community one may find two families occupying two farms differing greatly in size and both families doing exceedingly well, economically and otherwise. One family may be well suited to, and enthusiastic about, large-scale production of beef cattle with a high requirement of land for summer pasture and winter feed. The other family may be equally fit to produce dairy cattle and hogs. It may operate satisfactorily on 160 acres or even less. Each family is doing what it likes best to do and what it does best. Each is serving both itself and the public interest.

In many farming communities it is desirable that there be farms of a variety of sizes so that there is effective appeal to a variety of human types. Here is one place where many farm planners come to grief. They try to fit widely diverse human beings into a common mold in so far as size of farm is concerned. I recently visited an irrigation project that was opened early in the present century on the basis of 40-acre farm units. Now, after forty years, most of the farms, either by ownership or as operational units, are 80 acres or more, or at least twice the size that the planners tried in vain to fix. Any attempt to determine the proper size of farm without taking human variability carefully into account is liable to fail.

The third factor is probably the most important of the three. It is the conception that people have of the dominant purpose of farming. There are two opposite extremes of conviction on this question and both of them in the long run probably are unsound. On the one hand, there is the conviction that farming is conclusively a business, like the manufacture of glue or of soap. By this standard that type of farming is best that makes the most money or that produces the largest volume of farm products per unit of land area, or per man engaged, or per dollar invested, whichever of these factors seems most important at the time and place. By this standard a farm

is simply a "factory." In Russia, where there are many "wheat factories," the prevalence of this conviction is probably associated with the causes that led to the nationalization of the land and to the establishment of immense state-operated farms and the so-called collective farms.

The conviction that farming is exclusively a business is far from unknown in the United States. Its influence is partly responsible for the present trend toward fewer and larger farms here. One of several reasons why this attitude of farming seems unsound is that it neglects, or at least greatly underestimates, the importance of farming as an essential requirement for long-time human welfare as related to the physical and spiritual values inherent in country life. It helps to drive the people from the countryside to the congested centers of population where for most human beings living conditions are unfavorable.

At the opposite extreme, there is the conviction that farming is exclusively a way of life. This conviction is often an important factor in the making of the hillbilly. By this standard, that type of farming is best that requires the least hard work, the least confinement, and that leaves the farm family freest to go fishing or hunting or to the camp meeting or the farm auction sale whenever it so desires. Farm families having this attitude are found extensively on small, unproductive, poorly improved farms. Communities composed chiefly of such families often have low standards of health, sanitation, education, housing, citizenship, although they frequently contain individuals of engaging charm and likeable temperament. The conviction represented by such communities seems unsound because it fails to provide adequate opportunity for the vigorous, ambitious, and enterprising.

A third kind of conviction regarding the dominant purpose of farming is midway between the two just mentioned. It is that farming should be neither exclusively a business nor exclusively a way of life; that it should be a balanced combination of the two. Farm families having this attitude recognize that in a society whose parts are highly interdependent, each person should strive to do what he likes to do and what he does well; that what he does should be sufficiently profitable financially to enable him to purchase what he needs but does not produce; and that his business activities are justified only if they permit him to live an interesting and satisfying life. If a business becomes

so large that the family is a slave to it, it is too large. If expansion of the business would persistently overwork the farmer and his family, it is not warranted. If the farm is too small to permit the operation of an appropriate farm business sufficient to provide for a decent level of living, it is too small. If we live badly we are poor, no matter how much money we have or how much leisure.

The aforementioned Kansas farm woman and her husband recognize this simple truth. They know that they are making a good living; that they are enjoying their work and their life on a farm only about half as large as the "average" Kansas farm. They know that if they expanded their business materially, they would invite labor difficulties and other "headaches" that would impair their well-being. They combine their business with their living and they do not permit either to impair the other. They place living first, but they know that good living requires a certain minimum of economic efficiency and financial gain.

How large should a farm be? Each farm family should answer the question for itself. It is not practicable to determine for all farm families precisely how many acres a "family-size farm" should maintain. It depends on the location, on the human factor, on what the family likes to do, on its attitude regarding the dominant purpose of farming. For most people happiness and satisfaction certainly are not to be found in the idolatry of size and of numbers or in pecuniary returns gained at the expense of physical health, of serenity of mind, of sufficient leisure to enjoy the beauties of the countryside, or of the opportunity to serve the community as good citizens, nor is it found in idleness and indolence.

A farm should be large enough to suit the aptitudes, interests, and abilities of the family that operates it and to satisfy the actual financial needs of that family. When these requirements are met, the farm usually should not be enlarged. For we have long since reached a position in which an increase in the size of farm requires a corresponding reduction of the number of farms. Reduction of the number of farms reduces the number of families to which farming and farm life are available, and this is unfortunate for the families that are excluded and for the national welfare.

The mechanization of agriculture has generally encouraged and often required increases in the sizes of farms. Ownership and operation of large-scale ma-

chinery is usually not practicable on small farm units. But two current developments in mechanization give promise of slowing down the trend toward larger and fewer farms. One of these is the small mechanical unit which is feasible on small farms and the other is the "custom use" or the cooperative use by a number of small farmers of mechanical units owned by the group or by a single individual. Every time two or more farmers obtain the services of one corn picker, or combine, or portable baler, they exert an influence in opposition to continued enlargement of farm size.

Man-Made Moisture

At New Mexico School of Mines scientists have made snow fall by dropping ice pellets from a plane into dense clouds. The ice caused clouds to give up moisture in the form of snow.

Capper's Farmer

Problems of Livestock Producers

Condensed from The Shorthorn World

Dr. A. D. Weber
Kansas State College

PRIOR to the outbreak of World War II, farmers and ranchers had made much progress in the use of standard systems of livestock production which were peculiarly adapted to their individual set-ups. There was rather widespread recognition of the fact that a system of livestock production selected for a particular farm or ranch should be large enough to challenge the interest of the operator and to offer the possibility of a substantial return. The more successful stockmen were using systems of livestock production which were in accord with their own abilities, size and productive capacity of their farms and ranches, and the conservation practices in use or contemplated.

Recognition also was being given to the fact that in the long run success for most stockmen depended more upon good management than upon trading ability, though it was recognized that buying wisely and selling advantageously had an important bearing upon profits. Furthermore, bankers, business men and other public-spirited citizens were encouraging livestock-minded farmers to balance their farm and ranch operations with sound livestock programs. Much remained to be done, of course, in obtaining widespread adoption of sound livestock programs. Yet there is no gainsaying that real progress was made in the years immediately preceding World War II.

On many farms and ranches, the trend toward the adoption of clearly defined systems of livestock production was interrupted during the war owing to the unusual conditions which prevailed through this emergency period.

Most farmers and ranchers are faced with the problem of reconverting from a wartime basis to peace-time procedures and requirements. In some instances, the change is of little consequence, since the livestock program had to be changed only slightly to meet new conditions brought about by the war. In many cases, however, the recon-

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version process will necessitate drastic changes in order to conform to long-time trends with respect to feeding, management, and marketing practices.

The first step in determining what adjustments are needed is to make certain that the temporary shifts which took place during the war are clearly understood. By distinguishing temporary methods and procedures from those which are inherent in a sound, long-time program, it will be much easier to plan the change back to more stable production practices and hence to put livestock operations on a sound basis in the immediate post-war period.

Some of the deviations from normal methods and procedures of livestock production which were necessary in order to meet war-time demands were as follows:

1. Emphasis on quantity instead of quality. This was accomplished by narrowing the price spread between different grades of meat animals.

2. Production of slaughter cattle with little or no gain. It was necessary to use maximum quantities of roughage and grass in beef cattle rations in order to have sufficient quantities of grain for human consumption and for feeding to dairy cattle, hogs and poultry. Price regulations and control measures were formulated to accomplish this objective. This policy made it necessary to carry beef cattle to older ages and heavier weights since younger cattle will not fatten on roughage and grass alone. In making this adjustment, there was a marketing lag for a time until large numbers of steers were old enough for use in this type of program.

3. Seasonal price trends largely disappeared owing to the stabilizing influence of control measures. It was no longer possible for the better-than-average stockman to gain an advantage from marketing when supply was small and prices relatively high.

4. Unusually favorable weather conditions and the pressure of producing for the war effort tended to minimize the importance of maintaining reserve supplies of roughage.

5. Prices advanced steadily during the war period and as a consequence even poor management usually did not keep a livestock enterprise from being profitable.

The net result of all this was that successful operators modified proven systems of livestock production greatly in order to make larger profits. Those who had never used a definite system

of livestock production but had merely drifted along with a livestock "situation" on their farms and ranches found that operations which formerly barely broke even or showed a loss almost over night were giving very satisfactory returns.

The danger now is that both those who modified their livestock program and those who never had a program will not make the adjustments necessary to meet the changed conditions of the post-war period.

A premium again is being paid for quality. Grain is being used for fattening beef cattle and younger cattle again have a distinct advantage over heavier, older cattle from the standpoint of economy of gains and the safety of the beef cattle enterprise. Seasonal price trends have returned and again are dominant factors in adapted systems of livestock production. Prices are still very high but are more likely to be adjusted downward than to advance in the period just ahead. Nobody knows what the weather holds in store this year or any other year for that matter, yet it is only reasonable to suppose that there will be periods of short feed crops for which stockmen should be prepared.

There is a real need for farmers and ranchers everywhere to return to the fundamental principles which governed successful livestock production between the two World Wars. If these essentials are followed, there is a good possibility that the adjustments just referred to can be made, in most instances, without suffering financial losses.

One must be keenly aware of the place of farm animals in our agricultural economy to have a clear understanding of the essentials for successful livestock production. Because of their close relationship to the use of both crop and pasture lands, livestock contribute significantly to the conservation of agricultural resources. Grass and roughage, which are the principal products of soil conservation and diversified farming, can best be utilized as livestock feed; in fact, unless they are disposed of in this manner sufficient monetary returns cannot be obtained to pay the cost of conservation practices. Feed grains also must find a satisfactory market through livestock if better farming practices are to be continued permanently.

Because of the importance of preventing further depletion of the soil, conservation authorities are suggesting that the pasture acreage be increased materially. Manifestly, if most economic returns are to accompany the attainment of this objective more attention than ever will have to

be given to livestock production.

Since farm animals have such an important place in our agricultural economy, the qualifications which the individual farmer or rancher must have in order to produce livestock successfully warrant special consideration and emphasis. In fact, of the major essentials for successful livestock production, the human factor is perhaps the most important of all. Now, in addition to the specialized duties and responsibilities associated with the profitable utilization of pasture, forage crops, and feed grains, stockmen are concerned with efficient crop production and approved conservation practices to the same degree as farmers whose operations are limited to the production of cash crops. Thus, their job is much more complex than that of farmers who specialize in cash grain production. It is a job that requires close attention twelve months in the year. Success comes only with intelligent study and conscientious effort. There is no substitute for brains and hard work on a livestock farm.

Now Pest Damage Can Be Predicted

Condensed from The Western Farm Life

Gladys Harrison

As meteorologists have made progress in long-range predictions of the weather, so entomologists have been successful in predicting the invasions of hordes of insect pests which destroy crops and cause enormous economic losses to farmers.

These predictions give farmers time either to plant crops not harmed by the insects or to protect more delicate crops by covers, insecticides or special cultural practices. In years of low insect population these forecasts save farmers the expense of insecticides and the time spent in applying them.

Two of the best examples of long-range forecasting of anticipated insect ravages are those on tomato fruitworm and on the

Reprinted by permission from The Western Farm Life, Denver, Colorado, May 1, 1947

beet leafhopper in Utah. Some years as many as 20 to 30 per cent of tomatoes have shown fruitworm damage; other years injury has been less than 1 per cent. These worms attack crops other than tomatoes and are also known as corn earworms.

Since research has shown that dusting with calcium arsenate gives 70 to 75 per cent control of fruitworms, canners attempted to insist that growers dust their plants each season. While dusting is advantageous in years of high fruitworm infestation, in other years many tons of insecticides and hours of labor have been wasted. During such seasons, farmers who did not dust had no more wormy tomatoes than those who did. This situation also was the cause of poor control in years of heavy infestation, because many farmers became discouraged with the results and did not dust.

In only 6 of the past 13 years have tomato fruitworm control measures been justified. But the question is how to know beforehand which years the worms are to be plentiful enough to seriously damage crops. Farmers cannot wait until the worms are inside the tomatoes before they dust.

Research on the control of the tomato fruitworm began in Utah in 1936 when the federal government established a station at the Utah State Agricultural College in Logan. Howard E. Dorst was put in charge of the work, assisted by Walter E. Peay. These men have worked with George F. Knowlton, of the Utah agricultural experiment station.

Six years ago, Peay began a study of the habits of this pest to discover what causes the great variation in abundance of worms from year to year and whether the size of infestation can be predicted early enough for control measures to be adopted. This work revealed factors that influence fruitworm infestations, among which are the time the eggs appear, their abundance in relation to the amount of fruit present on the vines, the percentage of the eggs and worms parasitized and climatic factors.

Using this knowledge, 24 tomato fields through the tomato-growing area of Utah are examined each week during July for tomato fruitworm eggs. Twenty-five leaves on each of 12 plants in various parts of the field are examined. Studies have shown that if not more than one egg is found per 100 leaves, fruitworm infestation will not be heavy enough to justify control measures; if more than this number are found, farmers are advised to dust their fields. This information is given out by the press,

the radio, by letter to the canning companies and through county agents.

Other research conducted by Peay, Dorst and Knowlton has shown that one application of dust applied at the most effective time—while the worms are small, feeding on the tomato leaves and before they bore into the fruits—has been as effective as three applications less timely.

At present, dusting is the best means of tomato fruitworm control. With the development of new dusts control as high as 96 per cent has been achieved. Machines developed by the canning companies working with Peay are now available which will dust nine rows of tomatoes at a time. Thus, by traveling up the field one way and back the other in the same tracks, nine rows can be dusted on each side of the roadway. These roadways established every 18 rows can be used later during the picking of tomatoes.

All this intensive research has given Utah entomologists the basis of facts necessary to predict tomato fruitworm infestations. During the past 4 years light infestations have been successfully predicted. This has resulted in savings to the tomato growers of from $240,000 to $280,000 for the period.

Forecasting beet leafhopper invasions is based on more years of research than that of the tomato fruitworm and is probably of greater economic importance to the farmer, since about 8,000 Utah farmers derive a large part of their cash income from sugar beets and as many more from tomatoes. Both these crops are harmed by this insect which in the course of its feeding, transmits a virus causing curly-top disease.

Serious damage has not occurred in all years, but during the past 28 years serious outbreaks have occurred 10 times, moderate outbreaks 10 times and mild outbreaks 8 times, resulting in a loss of about $10,000,000 to the tomato industry and an even greater loss to the beet industry. Previous to the release of the resistant sugar beet, annual loss to Utah beet growers alone during outbreak years was about $2,000,000.

It was as early as 1906 and 1907 that E. D. Ball, entomologist and director of the Utah station, first proved that the curly-top disease of sugar beets is transmitted by the beet leafhopper. But discovering the source of the leafhopper invasions and studying the life history of the insects took additional years of research. Beginning in 1924, Knowlton made a study of its range and breeding grounds as

well as studying the development and damage of the curly-top disease. He pointed out that Russian thistle is the most common host plant of the leafhopper.

The Sevier county area in the vicinity of Richfield was most frequently and heavily infested by the curly-top disease. But checks of the fields in early spring produced neither leafhoppers nor their eggs. In 1927 the United States department of agriculture established a station in Richfield to study the problem.

Leafhoppers Come From Desert

It took further years of research to prove that the leafhoppers do not overwinter in Sevier county but migrate from the southern desert areas of Arizona, California, Nevada and Utah as host plants begin to mature in the spring. These migrations are determined by the direction of prevailing winds and by the mountain ranges.

To provide up-to-date information on the leafhopper situation to growers and processors of beets and tomatoes, extensive surveys of the leafhopper breeding areas are made in the fall and early in the spring in advance of planting time.

If the winter is severe, many bugs are killed off. If the spring is late or dry, the desert host plants—Russian thistle, alfilaria, borage, mustard and plantain—do not develop rapidly and there is too limited a food supply for the leafhoppers to increase to threatening numbers. If conditions on the southern deserts are very favorable, insects may arrive before crops are up in the spring. If they arrive late, beets may be so well developed that they are not seriously affected by the leafhopper-borne disease.

When curly-top disease of sugar beets was first discovered, the problem was attacked not only by the entomologists but also by plant breeders. Resistant varieties of sugar beets have been bred and now are generally grown. These varieties are not killed by the disease if attacked when in full leaf. However, if the insects feed on the plants while they are very small, even these varieties may be killed or stunted. When forecasts show that a heavy migration of leafhoppers is expected, beet growers can plant early enough so that the plants will have sufficient growth to resist the disease.

Other crop plants in addition to sugar beets are susceptible to curly-top disease, including tomatoes, beans, squash, cucumbers and cantaloupes. The problem with these crops is slightly different than with sugar

beets. When migration of insects starts, these plants may be covered with leafhoppers, yet in a few hours most of the leafhoppers die or move, because the juices of these plants seem to be toxic to the insect. The hoppers probably light on them because they come in such hordes that they must light somewhere.

If plants are sufficiently close that all of them are not attacked by the pest, the plants remaining will grow. Consequently, in years when heavy leafhopper infestation is expected, growers are advised to space their tomato plants close together. Then surviving plants will fill spaces left by those killed by curly-top. In tests, yields from double hill plantings have more than paid the cost of the extra plants.

Not all beet leafhoppers carry the virus of curly-top disease, and the percentage has varied from year to year. Although the evidence is not conclusive, it is thought that certain plants, especially alfilaria and Russian thistle, carry the virus and that the leafhoppers get it by feeding on these diseased weeds.

Control of the beet leafhopper is an important argument not often mentioned in favor of range improvement by seeding to better forage varieties. When native range plants are removed, either by over-grazing or cultivation of submarginal lands not suitable for crop production, the greatest natural check on the leafhopper —the struggle for food—is removed. Russian thistle now covers thousands of acres of land and supports countless millions of beet leafhoppers. Elimination of Russian thistle and other weeds of low forage value from the western ranges in the past few years has been of great benefit in reduction of leafhopper numbers. If the Russian thistle were eliminated, there would be no leafhopper problem.

Pointers on Pigs

Condensed from Farm Journal

George Thiem

MANY a boy leaves the farm for supposedly better opportunities in the city. Frank Hubert bucked the trend. He left the city (and a $12 a week job as a grocery clerk) to return to the rundown 140-acre family farm.

By bucking the trend ever since, Hubert has built up a $100,000-a-year hog business—probably the biggest "pork factory" in the middle west—a mile or so from Saybrook, Illinois.

Most of the things Hubert has done to make money on a big scale will work for any hog raiser, whether he has one sow or a hundred.

For example, when the "in-and-outers" stop growing pigs, Hubert expands, and usually hits the jackpot.

The average farmer sells hogs once or twice a year. Hubert has 'em on the market nearly every month; at some seasons every week. His marketing rule is simple: try to miss the peak runs in December and May; have something around the place ready to sell when market receipts are low.

You'll find as many novel ideas and labor savers on Hubert's rolling farm (it's grown to 430 acres) as you will in a modern industrial plant. He needs them, because pigs arrive at the rate of 50 litters a month, right straight through from the first of March until the first of November.

Their feed and care is organized better than an Army chow line. His pig "cafeteria," like an all-night restaurant, is always open. The self-feeders are always filled with shelled or ear corn, protein supplement, and minerals. Fresh water is always on tap the year around.

But instead of hauling the food to the pigs, Hubert does just the opposite. Instead of one big hog "hotel," he has more one-family sow-and-litter cabins than a dozen tourist camps. Water is piped to the fields. Big, 2,000-bushel knock-down corn cribs are set up in the middle of 40-acre hog pastures. He takes a few boards off the bottom, and makes them self-feeders. He puts up temporary shade and shelter, and builds "creeps" where the young

Reprinted by permission from the Farm Journal, Philadelphia, Penna., May, 1947

pigs can eat unmolested.

This system not only cuts down disease and saves labor—it helps the next year's crops. Fields that once grudgingly turned out 40 bushels of corn an acre now average 90—without any other fertilizer than hog manure, ground limestone, and phosphate.

Sanitation is another watchword. Every sow gets a soap and hot-water bath and a clean, disinfected portable house with fresh straw in it, three days before she farrows. All pigs are vaccinated.

In cold months, the houses are set side-by-side along an electric line. They are banked with cornstalks or straw. Inside there is an electric lamp brooder and creep so that the pigs won't be crushed by the sow. Each house has a small private "front yard" of fresh gravel.

Sows and litters stay in these houses two to three weeks before being moved to clean, permanent quarters on alfalfa, clover, or rye pasture. When Hubert was starting out, either he or his herdsman used to stay up at night to act as midwives for the farrowing sows. It's a job many farmers dislike, but it paid. He averaged nine survivors per litter for two successive years.

Here are some other Hubert management ideas: after the pigs are weaned at 8 weeks, 300 to 400 head are run together in a single pasture.

Sows are shipped after three litters. Lighter sows are more nimble, kill fewer pigs by lying on them.

Hubert breeds summer or fall gilts to farrow their first litters in warm weather, when conditions are best. In the winter, market shotes are brought in from the fields and fed on a concrete floor next to the granary. Spouts bring shelled corn down from overhead bins to troughs and self-feeders. When he feeds in the field, Hubert uses a self-dumping rubber-tired wagon, and feeds on a portable plank floor.

A year ago, Hubert turned the active management of his business over to Paul Curtis, a former county 4-H club leader, who is now his partner. Curtis is planning a 450-litter year—3,000 pigs. Hubert, meanwhile, is getting a lot of fun out of life as an executive officer of the McLean County Agricultural Conservation Association.

What's Wrong with Hay?

Condensed from Capper's Farmer

C. B. Bender

New Jersey Experiment Station

A BIG change in livestock feeding is due. It will be forced by soil needs. Fertility must be rebuilt and preserved. That means more acres in hay crops and fewer in grain. Less grain in turn means that more of the milk, meat and wool must be made from coarse feeds.

Can that be done profitably? Wartime experience taught us a lot about substituting pasture, hay and silage for scarce grain and protein supplements. Volume of livestock products turned out through the war period suggests future possibilities. If better-quality hay had been available, that volume could have been greater.

Forage, in the form of hay and silage for winter and pasture for summer, is the basis of all beef cattle, dairy cow and sheep rations. Fodder, grains and by-product concentrates are added merely to supplement it. The amount of supplement required is determined by the quality of pasture or roughage. Here's an example:

For every ton of poor-quality hay fed to a cow, 500 pounds more grain must be added to keep up production. Poor-quality hay also often causes vitamin and mineral shortages in animals. Lack of these protective elements has been blamed for night blindness, rickets, digestive troubles, unthriftiness, pneumonia or even death among lambs, calves and colts. In older animals, poor-quality roughage has caused muscular, bone and nerve troubles and failure to breed. Low-grade hay also added to protein shortages during the war.

Now if stockmen feed less grain, they must have better roughage. First requirement is to grow the crops on good land, or to apply fertilizers to make up what the soil lacks. The second is to preserve the quality produced. Hay must be cut at the right stage, handled as little as possible and put up before it weathers. Added insurance will be available when mow-finishing methods are perfected. Maybe crushing the stems as they are cut, or some other means will be

Reprinted by permission from Capper's Farmer, Topeka, Kansas, May, 1947

developed to speed the curing and reduce hazards.

Clover or alfalfa hay can lose 20 to 50 per cent of its feeding value in rain. This comes from leaching, bleaching, shattering and from action of moisture, enzymes and heat. Nutrients which are most easily digested by animals and most valuable to them are the ones lost in the field. Ways must be found to preserve more of them.

Here are some comparisons which show the value of quality roughage: The best alfalfa hay may contain 18 per cent protein; in poor alfalfa the percentage may drop to 11. Timothy cut at the right stage and properly cured will contain 10 to 11 per cent protein while poor timothy may have only 5. Further, more of the protein in excellent hay is digestible.

It's no trick to grow 4 tons of alfalfa an acre on fertile soils. If it is cured into excellent hay, the protein yield will be 1,440 pounds an acre. Poor hay will yield 800 pounds an acre. The difference is 640 pounds, without considering greater feeding value of the protein in the high-quality hay. A farmer would need to feed 28 bushels of soybeans or 118 bushels of corn to make up that difference.

In total feed value, the comparison favors high quality again. More than half, 53.7 per cent, of excellent hay is digestible, while only 44.9 per cent of poor hay is digestible. That's a difference of 176 pounds in a ton. In a 4-ton yield that would total 704 pounds. The stockman would need 15.5 bushels of corn to make up the difference.

A 40-acre field of well-fertilized land should produce 160 tons of high-quality hay. If the loss in curing it amounts to 30 per cent, that means a reduction equal to 48 tons of hay or 32 tons of dairy feed. At the recent price for such feed that tonnage would be worth $2,560.

We've got along for years on any kind of hay, good or poor, that happened to be on hand. Feeding that hay with silage and plenty of grain took care of milk, meat and wool production pretty well. Many stockmen held the idea that cheap grain and protein supplements were the answer to low costs. They forgot that cattle and sheep were designed by nature to consume liberal quantities of roughage. For instance, the cow's 4 stomachs and intestinal tract have a capacity of eight 40-quart milk cans. Dairymen, especially, have tried to convert this animal into a grain burner because it is easier to feed grain. Yet the cheapest nutrients are those in high-quality hay.

1,000 Acres Back to Work

Condensed from New Jersey Farm and Garden

Melvin C. Krampf

In capsule form, the Manasquan River Drainage Project in Central New Jersey demonstrates what can be done to reclaim tillable land that has fallen prey to one form of erosion.

Now five years old, the drainage project, along five miles of the upper Manasquan, has resulted in rehabilitation of over 1,000 acres of rich "bottom land" on the Atlantic Coastal Plain and has benefited many more acres of rich farm upland by affording adequate drainage.

Many farms which had been completely or almost completely abandoned are again in cultivation. Some which had ranged from poor to fair are now profitable enterprises, with profits up as much as a third and land values increased even above what they would bring in an inflated market. Farmers along the Manasquan in Freehold Township, Monmouth County, which felt the most direct benefits from the project, are enthusiastic and describe it as their greatest boon in many a year.

In addition to actual land benefits, the project has resulted in improved mosquito control and decreased road maintenance, as the river now never overflows, even in the severest storms. Five years ago even moderate storms inundated roads and bridges and left hundreds of acres of farm land under water for days, as the water table, due to clogging of the stream by silt and debris, was as much as eight feet above normal.

The total land salvage is admittedly an infinitesimal portion of the 46 million acres of good land in the country, but the project shows that with co-operative efforts most land wastage can be licked and a substantial reduction can be made in the 3 billion, 844 million dollar yearly loss resulting from land waste due to natural causes. It is one of numerous similar projects in the 1,700 soil conservation districts throughout the nation.

This particular work is part of the erosion control being done by the Freehold Soil Conservation District, New Jersey. The district is a legal subdivision of the state fostering the conserva-

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May, 1947

tion of our soil and water resources and is managed by farmers within the district.

H. H. Bennett, chief of the Soil Conservation Service, U. S. Department of Agriculture, last fall told the Bicentennial Conference on Engineering and Human Affairs that "we have no reason for complacency" when we regard the future problem of feeding America's hungry millions.

Dr. Bennett said that we are already faced with a shortage of good land, having "ruined more good land in less time than any nation in recorded history . . . we have little margin left." He added that we still have enough productive land if we take care of it, but we can't hope to maintain present living standards if we lose much more. Hence the importance of projects like the one in Monmouth County.

Forty years ago the Manasquan River and its tributaries were kept open by the cooperative efforts of farmers working the watershed land. Labor was cheap and it was the accepted practice to maintain farm drains, brooks on the farm, and the river itself during the winter months.

As the nation moved in to the machine age, however, and labor became expensive and scarce, drainage work was neglected and as a consequence the upper reaches of the river filled with silt and debris, the stream became sluggish, backed up, and became a morass, ruining hundreds of acres of tillable land and creating a drainage problem on thousands of other acres. As the bed of the river filled, tile drain from farms clogged and became useless.

Such was the condition when the supervisors of the Soil Conservation District decided in 1941 that this was their first and most urgent problem. The farmers' petition was received favorably and work got under way that fall. Fortunately the Civilian Conservation Corps was then in full swing and plenty of husky young labor was available in the CCC camp at nearby Freehold, hence the work made rapid progress. Technical and other assistance was made available by the soil Conservation Service of the USDA.

Using draglines and dynamite, S.C.S. engineers and CCC boys by May 18, 1942, had excavated four and a half miles of the stream, creating a 20-foot wide channel that ran between banks from 20 to 40 feet wide at the top and insuring that the Manasquan would not revert to a morass for a good many years. In all, 84,000 cubic yards were removed to carry drainage water from 20 square miles of land that

is described as being in the "Eden of the Garden State."

Much credit for success of the work belongs to R. C. Clayton, chairman of the district supervisors and chairman of Freehold Township, who for years had advocated draining the Manasquan. Mr. Clayton not only offered the idea, but worked tirelessly to put it into practice. Mr. Clayton says, "That field would have mired a goose a few years ago," pointing to areas beside the stream which are now in cultivation.

The reclamation was "a wonderful thing" in the opinion of C. Arthur Burke. Mr. Burke says.

"You couldn't fly over parts of my woodland five years ago," he says, "but now we are taking timber out with tractors and experiencing little difficulty. Before the reclamation we seldom got anything from our peat meadows. Now we use tractors where horses used to mire and the peat tests 92 per cent humus—and we get it out easily."

Mr. Burke says the drainage work put his entire 125 acres of farm land back into cultivation and helped his 92 acres of meadow and 116 acres of woodland. In the last two years he has put 30 acres of farm land back into cultivation. Five years ago they were useless bogland, breeding mosquitoes—a summer-long nuisance.

Wonderful Crop

The summer of 1942 was particularly wet, with 52 inches of rainfall, compared to a normal 31 inches, and had it not been for the re-opened Manasquan the Burke farm would have remained largely out of cultivation. As it was, his son, Woodrow, who farms the place, planned to put in 65 acres of corn and prepared the ground four times, only to be rained out. He finally got in 30 acres and planted the rest in soybeans and buckwheat and got a wonderful crop. Mr. Burke is sure that during a like year before the river was drained the crop would have been a miserable failure.

Heat — The Enemy of Egg Quality

Condensed from Everybody's Poultry Magazine

Carl O. Dossin

THERE is nothing a poultryman can do to improve the quality of an egg after it is laid, but there is much he can do to maintain the excellent interior quality most eggs have when they are produced.

After careful observations and tests, two Cornell University research workers, Sharp and Powell, named heat as the thief of egg quality. They found that when fertile, new-laid eggs were held at 99.6° F. for only three days they dropped to U. S. Standard grade. It required eight days at 77°; 23 days at 66.8° 65 days at 44.6°; and 100 days at 37.6° to accomplish the same degree of deterioration on other lots of similar eggs.

Many practical poultrymen have learned this same lesson—usually after their eggs have been graded down, with corresponding shrinkage in the size of their egg check. There is nothing difficult nor expensive in holding egg quality on the farm. All that is needed is to follow the time-tested methods which have worked in the past. With hot weather coming on, this is a good time to review the steps in a program of farm egg care.

Holding an egg at a high temperature for even an hour seriously injures its quality so all broody hens should be removed from the nests as soon as they are detected. When they happen to be on a nest in which there are some eggs, the eggs will be kept at incubation temperature until gathered.

Eggs must be gathered frequently. Poultrymen who have tried different schedules find that gathering three times a day, at approximately 9, 12, and 4 o'clock, works out well. The eggs should be gathered in open woven or wire baskets, made strong enough to hold their shape to prevent breakage. Eggs should be taken to the egg room immediately after gathering to insure rapid cooling.

To find out what relationship there was between egg room location, in respect to ground level, and egg room temperatures, comparisons were made on several Connecticut farms in the summer of 1932. In 31 rooms located above the ground, the

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average temperature during June, July, and August was 67.9° while among 40 egg rooms which were halfway below ground average temperatures of 64.1° were maintained. In 130 egg rooms which were entirely below ground the temperature was 62.7°, and in the 10 best rooms out of these 130, an average temperature of 57.9° was found.

An inexpensive method of reducing egg room temperature was worked out by experiment station workers in Ohio. They found they could lower the temperature 10° to 15° by using insulation and supplying additional moisture. Experience has shown that a relative humidity of 70 to 75 per cent is high enough to maintain good egg quality for a reasonable length of time when the room temperature ranges from 50° to 60°.

Various methods of removing the natural animal heat from eggs are used. Each poultryman must study his own conditions to determine the most efficient and economical method to employ. Since temperature and humidity are so closely allied, both must be considered. Cooling by evaporation is the scientific principal applied. The practical application is simple: Moisture in the egg will lower the temperature in warm weather.

How this moisture is supplied isn't too important. Water may be spilled on the floor, carried into the air by evaporation from cloth or sand, or allowed to run down the walls from overhead pipes. The latter method gives the poultryman more desirable working conditions, so is usually preferred. Regardless of the method used, all egg cases should be placed on skids or racks and kept off the floor.

Some poultrymen have springs in their egg rooms and allow them to flow over a portion of the floor to increase the area of evaporation. If the pressure tank for the water system is located in the egg cellar, it will be cool in summer and help to lower room temperature. Hanging a coil of pipes on the wall of the egg cellar and arranging the connections so all the water from the well will have to be pumped through it will also help to lower room temperature in the summer.

Commercial poultrymen with large flocks may well consider the use of commercial cooling units in their egg rooms. When these are used, the egg room can be located on the ground floor, which eliminates carrying eggs down and then up the steps again. Some means of controlling the humidity in the egg room should be used in connection with these coolers.

Poultrymen who hatch a large

number of chicks during the summer months have also found commercial cooling units profitable. The coolers are usually operated at a temperature of 50° to 60° in the summer months to avoid "sweating" when the eggs are taken out into a warmer room.

The use of a house fan in the egg room or egg cellar will aid in the rapid removal of animal heat from the eggs. In using fans, there is one caution, however, the fan should never be allowed to blow dry air directly on the eggs. Forcing dry air over the eggs causes too rapid evaporation, resulting in large air cells. Direct the fan against the wet floor or wall or against a wet pad of excelsior or burlap. Just the movement of the cool, damp air in the egg cellar is all that is necessary to hasten cooling.

Relative speed of cooling when eggs were placed in different containers was determined in tests at the Missouri College of Agriculture. In an egg cellar kept at 50°, a single egg on a tray dropped to below 68° in one hour. An egg in the center of three layers of eggs on a wire tray took three hours to get down to 68°, while it took an egg in the middle of a wire basket containing 156 eggs five hours, and an egg in the center of a galvanized pail containing 156 eggs 10 hours. When a fan was used to circulate the air in the egg cellar, eggs in a wire basket cooled to below 68° in about 45 minutes.

The use of a house fan to circulate the cool, damp air in the egg cellar is a practical, satisfactory method of cooling eggs. When used in conjunction with additional moisture and not directed over the eggs, a fan is about all the equipment the average poultryman needs.

Fall Tillage for Weeds

Late fall tillage often will kill more weeds than a similar spring operation before crop seeding. Agronomists at North Dakota Experiment Station have found it harder to kill French weed and common mustard in the spring because surface moisture is good and temperatures are cool.

Capper's Farmer

Greece Looks Ahead

Condensed from Soil Conservation

F. G. Renner

Chief, Range Division, Soil Conservation Service

SHORTLY after the end of the war, the Greek Government turned to the United Nations Relief and Rehabilitation Administration for help in improving Greek agriculture. It was recognized that the mountain villages had never been able to make more than a scanty living; that both mountain pastures and valley lands were seriously eroded, forests badly depleted, and additional irrigation and drainage urgently needed. Ministry officials had come to appreciate, too, that unless these basic causes of low agricultural production could be corrected, the extreme poverty among rural people would continue indefinitely. It was evident that any attempt to rehabilitate Greek agriculture would have to give major attention to conservation of the soil.

Accordingly, UNRRA was asked to provide the services of a group of scientists, to make a survey of conservation problems, and to develop specific plans for the improvement of conditions on a number of areas. It was expected the findings of such a survey would serve both as a basis for an immediate program of action and as a foundation for similar conservation projects in other parts of Greece, particularly in the mountainous sections.

After examining a number of areas, the Vouraikos drainage was selected as the first to be studied. Originally the mountainous area of this watershed, like much of Greece, had been forested with fir at the higher elevations and holly oak on the lower slopes. Many centuries of heavy population have brought vast changes in both the appearance and character of the original forest. Much of the mountainous area has been cleared and used to grow wheat. Many of the steeper slopes have eroded so badly that they have been abandoned for cultivation and are again slowly reverting to oak brush. The grazing of the area for centuries by sheep and goats has also changed both the vegetation and the land. With the ex-

Reprinted from Soil Conservation, Washington, D. C., May, 1947

ception of a few small areas, the original oak forest no longer exists. It has been reduced to brush, a foot or two in height. Many trees and shrubby species that were probably once abundant have been almost eliminated by centuries of overuse.

Soil erosion, resulting from heavy grazing and unwise farming practices has seriously damaged much of the agricultural land, even on moderate slopes. During flood periods, which occur nearly every winter, a great deal of surface soil is removed from the steeper slopes. With it goes much coarse cobble and gravel. Most of this erosion debris is deposited in cone-shaped fans in the valley. These fans have blocked the main stream channels and transformed much of the fertile meadow land into swamps, thus further reducing the available agricultural land. The finer sediment is spread over the entire valley floor or carried down the main river to the sea. Most of the soils are poorly developed and low in organic matter because of this continuous erosion and deposition.

Like many older agricultural areas of the world, the region is densely populated, with far more people than its depleted natural resources can adequately support. In this particular watershed nearly 10,000 people are attempting to support themselves on 62,000 acres, most of these acres eroded, some of them waterlogged, and all of them reduced in productivity.

The present types of farming operations are far from conducive to protection of the soil resources. The average family owns or rents 1.5 acres of irrigated land, 8 acres of dry-farming land, 24 acres of mountain-side grazing land, and 5 acres of mountain forest. The lower natural terraces are in grapes, or where irrigation is possible some of them may be in corn, with wheat in alternate years. Many of the steep slopes of the mountains themselves are in wheat, which too often extends over fair soils and poor to the highest summits.

In spite of the large number of domestic animals, particularly goats and sheep, there is almost no livestock industry as an enterprise separate and distinct from farming. In most cases, the livestock are owned in small numbers, each family having from one to four head of goats, a like number of sheep, and a donkey and an ox for draft and transportation. These animals are essentially members of the Greek farmer's family. They accompany him to the fields in the early morning, stay with him all day, and return with him to

the village at dark or after, to share the same roof.

In Greece, as elsewhere, land and its use is reflected in the living conditions of the people who depend on it for their livelihood. Destruction of the land resources and the accompanying poverty has reached the point where most of the families in the area studied have little or no money even for the purchase of necessities. Education, recreation, and cultural pursuits are almost beyond their reach. To maintain a bare existence, more and more land has been cultivated, much of it not adapted to farming. For the good of both land and people far too much land has been used for wheat and too little for fruits, vegetables and improved pasture to produce livestock products for family use.

Primitive methods of cultivation require long hours of hard labor in the fields. Much of it is performed by the women and children who also have to take care of such usual household duties as cooking, spinning, and weaving. These are particularly laborious because of the lack of such ordinary conveniences as running water, cooking utensils and lights. Only the crudest equipment is normally available. Bread is baked in an outdoor oven, but most other foods are prepared in a pan over an open fire. Because of the drudgery and time involved, the Greek peasant family usually has only one hot meal per day, and one cooked dish per meal.

In spite of the depleted condition of the land and the poverty-ridden condition of the people, the survey indicated astonishing improvements could be brought about within a short period, with relatively little effort. It was found, for example, that the irrigated land in the watershed could be increased 55 per cent by a simple drainage system that would reclaim lands now too wet to cultivate. An additional 23 percent of new lands were found suitable for irrigation farming. This makes a possible increase in irrigated land of 78 per cent. Such lands, of course, would be the most productive in the watershed. Acre for acre they should produce several times as much as the eroded, dryland slopes.

The area available for dryland farming could also be nearly doubled by replacing the every-other-year fallow system with continuous cropping. Without means to keep down the thistles and other weeds, the present system is of little benefit. If the proper changes in land use were made, many of the steeper eroding slopes would go back to brush; and still the area avail-

able for crops each year would be greatly increased.

Forage supplies could be increased tremendously. The yield of corn, 80 per cent of which is fed to livestock, could probably be quadrupled by the introduction of modern hybrid varieties in place of the ancient short-eared, 8-rowed flint type now grown. Alfalfa, wild peas, white, yellow, bur and sweet clover and vetch grow wild in the area; but aside from a few patches of alfalfa, very little use is made of any of these valuable legumes. The planting of some of these legumes with Italian ryegrass in the standing corn in August or immediately after harvest should greatly increase green pasturage from November to late April. This would also prevent much of the erosion of these lands during the period they are now bare. Where corn and wheat are alternated, planting sweetclover and ryegrass in the wheat should provide a green-manure crop and increase the pasturage from July to late April.

Greek sheep produce less than two and a half pounds of wool and about 50 quarts of milk annually; while the clip from the goats is less than three-quarters of a pound and the milk production about 60 quarts. The amounts of milk, wool, and meat produced could easily be doubled, even after the numbers were reduced to the capacity of the land. This could be done by improving the quality of the sheep and goats through the introduction of better sires and by making greater use of improved irrigated pastures instead of depending on the brush-covered mountain slopes for forage.

Altogether, over 50 specific recommendations were made to the Greek Minister of Agriculture. Descriptions of methods, plans, engineering designs, and specifications for improving the condition of the land and the people were included in the recommendations. If action is taken on only the major suggestions of the survey, agricultural production in the area can be doubled if not quadrupled within five years. If this improvement were to be extended to other areas where it is needed, it would materially raise the living standards of the Greek people, do much to bring about financial stability in the government, and might well be a material factor in insuring future peace in that part of the world.

No Fork on this Farm

Condensed from The Farmer

W. H. Kircher

EQUIPPING his feeding shed so that machinery does so much of the work that feeding 1,100 head of lambs or 130 to 140 head of cattle is only an hour's work a day, Peter Molenaar, has come near to doing what he set out to do. That was, as he puts it, to "retire and turn my farm over to machinery."

Even the pitchfork is an outmoded tool on the Molenaar farm. There is no need to have one around when feeding, and even haymaking can be done without one. Hay is run through a field hay chopper, blown into a hay keeper, and carried to self-feeders with a system of home built conveyors. Grain is run through a hammermill directly into the conveyor with the chopped hay.

The barn which was the predecessor to the present mechanized building was the usual kind. Suited to a horse powered farm with stable room for horses and dairy cows, there was much wasted space when Molenaar turned to lamb and cattle feeding. Anyway, the old barn had seen better days so the question to be answered was whether or not to repair and remodel the old structure or build a new one. He decided to do the latter.

The new building is of shed design. It is open to the south, but on blustery, cold, snowy days when snow might be blown in, big doors may be let down the entire 120-foot length of the building simply by turning a centrally located crank. The back of the building is against a slope with the ground level about even with the building's roof.

A pressure water system provides a steady water supply. There are nine self-feeders in the building, each of which is four feet high, four feet wide and 16 feet long. The feed conveyor which carries feed to the self-feeders runs the full length of the building. It is a slat, endless chain, trough type with slots in the trough floor above each feeder. At a right angle to the shed conveyor is a second conveyor which carries tthe feed in from outside.

Shelled corn or grain or both are put into a big, slanted floor bin at the bottom of which is a hammermill so placed that the

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grain or corn feeds into it automatically. The spout of this hammermill empties directly into the conveyor. Also emptying into this conveyor is a third conveyor from the large metal silo-like structure. This is the hay keeper into which the chopped hay is blown.

When the feeders are being filled the electric motors powering the conveyors and hammermill are started. Although grain is fed into the hammermill automatically, the chopped hay in the hay keeper must be fed into the hay conveyor manually. Feeder slots in the main conveyor are opened one at a time and left open until the feeder beneath is filled. When the feeders in one end of the shed are filled, the mechanism of the main conveyor is reversed and the feed is carried to the feeders at the other end. The feeders, being large, hold enough for a week, so filling them is a once-a-week job which requires about four and a half hours.

Mr. Molenaar started self-feeding lambs before building his feeding barn, and as has been the experience of other feeders, death losses were no heavier than when the lambs were hand fed. When he gets a shipment of feeder lambs he starts them on a mixture of 90% hay and 10% grain, and then as the feeding period advances he cuts down gradually on the hay and increases the amount of grain. His feeding equipment is designed to make these gradual changes in the ration. Of course the rate of flow of grain from the hammermill is always the same when the feeders are being filled. The adjustment in proportion of hay to grain is made by the man who feeds the hay into the conveyor from the hay keeper.

Another interesting Molenaar building, or rather a combination of buildings, are his granaries and corncrib. There is some small grain space in the crib, but not enough, so a concrete stave silo is used for one additional granary and a silo-like structure made of two old water tanks, bolted together, is used for another. Total capacity of the two auxiliary granaries is 6,000 bushels. A lateral conveyor from the corncrib elevator carries grain from an alley-way dump to the auxiliary granaries.

Before we visited the Molenaar farm we were told that this ingenious farmer had completely eliminated hand labor. He hasn't quite done that, but he has come as near as any farmer we've ever visited.

Making New Chestnut Trees

Condensed from Yankee Magazine

Arthur Harmount Graves

THE American chestnut, growing from northern New England southward in the Appalachians to Alabama, was attacked during the '90's by a deadly parasitic fungus introduced into this country on imported Japanese or Chinese trees. For a time the stowaway worked unnoticed, but it was at length discovered on native chestnut in the New York Zoological Park in New York City. Now, after 50 or 60 years, our fine American chestnut tree has all but disappeared. Only scattered shoots, with a short lease of life, remain, with perhaps a few isolated large trees in the high mountains of the southern Appalachians.

The principal value of the chestnut was in its timber—long-lasting and not easily subject to decay. Its tall straight trunks were invaluable for telegraph and telephone poles. Many old farmhouses have sills and construction timbers of chestnut. The bark was precious for its tannic acid content, used in tanning leather. In comparison with the timber, the value of the nuts was slight, but many of us remember when we went chestnutting on crisp October days.

The only way to outwit the parasite is by tree breeding. The Japanese and Chinese chestnuts resist the attacks of the parasite so effectively that certain individuals of those species are practically immune. However, these Asiatic chestnuts are generally low-growing and cannot replace the tall American chestnut as timber - producing trees. We therefore conceived the plan of breeding these low-growing, disease-resistant Asiatics with the tall, susceptible American, in the hope that in some of the offspring the desirable characteristics (namely the tall, erect growth of the American parent and the disease resistance of the Asiatic parent) would be combined. This breeding was begun in 1930. The Division of Forest Pathology, United States Department of Agriculture, has undertaken similar work and has been cooperating with us through the years.

Japanese-American

The Japanese species was

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available for breeding, and the result of the combination of American and Japanese chestnuts was at first encouraging. The hybrids showed great vigor and rapid growth—an expression of the phenomenon of "hybrid vigor," well known to all geneticists. In most cases they possessed the erect habit of the American parent—with a straight central trunk, not branchy and bushy like the Japanese. But they are still susceptible to the blight, although not nearly so much so as is the American parent.

But, as Dr. D. F. Jones, Geneticist of the Connecticut Agricultural Experiment Station (who is also cooperating with us), says, "The disease resistance is *in* these hybrids. If we put in resistance at the beginning, it must be still there (although 'recessive') and continued breeding should eventually bring it out."

At the age of 7 years or so, these hybrids, taking after their American forebears, began to get the blight and die; but at the bases of the diseased hybrids, or below lesions caused by the blight fungus, vigorous shoots began to appear. I believed that if we could graft the tips of these shoots *above* the blighted area we could "bridge" it so that the communication of living bark above and roots below, would be restored; this method of grafting (or more correctly "inarching") has been successful, so that we still have our Japanese-American hybrids and have continued breeding with them.

At the beginning the Japanese chestnut was the only Asiatic kind available for breeding. But I soon found that the Chinese species, some fine seedlings of which were given us in 1929 by the Division of Forest Pathology, United States Department of Agriculture, was the most disease-resistant of all species; and the crossing of this with the American chestnut began in 1934. In 1938 we began crossing our Japanese-American hybrids with the Chinese; and this combination, i.e. *Chinese Japanese-American,* seems to date, the best. Inoculation tests have shown that individuals with this pedigree in most cases do not take the disease.

However, in these *Chinese Japanese-American* hybrids, the spreading habit of the Chinese parent is dominant; and this year we are adding the American species to the combination to give it a more erect character. In a few cases the *Chinese Japanese-Americans* do show an erect habit. And this year, through the kindness of Mr. Michael Evans, of Greenville, Delaware, and Professor Maurice A. Blake, of the New Jersey Agricultural

Experiment Station, I have received a supply of pollen from tall, erect Chinese individuals, which we have applied to our most desirable hybrids.

As far as the production of nuts is concerned, the Chinese species seems satisfactory. Most individuals seem to be perfectly disease-resistant; and we find that care (i.e., a little cultivation, pruning, and fertilizing) increases resistance to the blight. The nuts are large and sweet. The nuts of the Japanese—often larger than those of the Chinese—have usually a somewhat bitter taste, although this tends to disappear on boiling.

On our plantation at Hamden, Connecticut, we have had nearly 400 bagged flowering branches this summer, representing 72 combinations in which different trees are involved. We have there, and at the plantation at the White Foundation at Litchfield, Connecticut, and at the Yale Forest in Tolland and Windham Counties, Connecticut, about 1,000 hybrids plus about 1,000 more trees of species, representing nearly every kind of chestnut known—from Europe, northern and southern United States, and Asia. This year the project is receiving the support of the Connecticut Geological and Natural History Survey as well as that of the Division of Forest Pathology, United States Department of Agriculture, and of the Brooklyn Botanical Garden.

How can you help us? In two ways. First: by sending us pollen of the American chestnut. It is getting scarce. Roots of chestnuts resist the disease more than do the trunks and branches, so that when a tree dies above there is time for shoots to arise from the base; and sometimes these grow old enough to bear flowers before being laid low by the disease. But flowers are getting less frequent.

Second: If you find nuts borne on any of these native shoots we shall be glad to receive them, and will plant them and label the resulting trees with the name of the finder and the locality. But the nuts (usually ripe about the first week in October) should not be allowed to dry, for drying kills the embryo so that the nuts will not germinate. They should be wrapped in sphagnum or peat moss, moist cotton, or something of the sort so that they will not dry in transit; and mailed to the writer at the Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn 25, New York.

What is Balanced Farming?

Condensed from The Kraftsman

C. R. Meeker

Extension Economist, University of Missouri College of Agriculture

"Good farming," From a run-down farm to alfalfa in four years," The cows and sheep do the work under a balanced farming system." These are some of the ways farmers describe Balanced Farming, a program started in Missouri but arousing much interest in other states.

The extension man is more technical and says, "Balanced Farming is simply a well-planned system of operating the individual farm unit to achieve efficient production, high net income, the improvement of soil productivity, and better living for the farm family."

The Balanced Farming approach to the problem on a farm is one which farmers understand because it includes the entire farm and home, rather than any single part. It is a unit approach, and that is the way we have to look at our individual farms. It could be likened to the clinical approach used when a man has a complete physical examination. Isolated aches and pains are cured by bringing about an improvement in the general health of the individual.

When a farm family decides that the Balanced Farming approach offers them the best opportunity to achieve their plans and hopes for their future welfare, they are ready to begin. First they analyze their present system of farming and living. They ask themselves a number of questions and attempt to find the answers.

Briefly, some of these questions and problems that farm people expect to answer and solve with a Balanced Farming plan are follows:

If we are livestock producers, we look at our pastures. Are they adequate? Are they the right quality?

Do we have enough roughage? Is there enough good legume hay produced each year for the needs of our livestock?

Is grain production a primary or secondary consideration?

Are we putting back as much as we take out from our soil in fertility and plant food?

Are we controlling erosion?

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Are we getting high acre yields? High yields are an essential part of any profitable farming system.

Are we improving the quality and productivity of our livestock?

Are we producing and marketing a quality product?

Are we controlling disease?

Do we provide ample water supplies the year round for livestock?

Are we providing for our family welfare as well as for our economic welfare?

Do we have our home and kitchen modernized with running water and other labor-saving devices?

Do we have all the proven practices applying to our particular farm and home correlated into a well-planned system of farming and living?

Do we have a high net income?

A balanced farming plan has to be made on the individual farm, and by the farm family. Unless it is their own plan and they understand it, they will not likely carry it out. But they need and should get all the help they can get from the county agent.

A basic aid in setting up the plan in Missouri is the Balanced Farming Workbook. Along with this Workbook we use the Handbook which contains the necessary reference material to use in making out the Workbook.

In the Workbook we map our farm as it is at present. Then we "walk" over our farm and study it carefully. If our cropland is sloping and subject to erosion, we, with the county agent's help, work out a water management plan for the farm. This water management plan will include the location of terrace outlets, diversions, terraces, ponds, etc. The whole water management plan should be worked out to make it easy and convenient to carry out the various operations of farming.

Terraces should be started near the farmstead and access lanes in order to lead away from the farm buildings. Care will be taken, so far as possible, to so plan the terraces that all parts of the fields can be reached the shortest way without crossing terraces or terrace outlets. Ponds will be located so that a single pond can water several fields and often a pond can be located so water can be piped to the farmstead, the barn, chicken house, etc. Better drainage is a problem on many farms; in fact, on most farms which do not have an erosion problem. So the water management program may involve erosion control, a drainage plan, or both.

After we have "walked" over our farm and carefully planned the new layout, we make out a

revised map of our farm in the Workbook.

We are now ready to consider how to fit our livestock program and other enterprises as well as our rotations; and a convenient field and farmstead layout, into a workable system.

In Missouri the cropping system will be made up of short rotations for the most part. In this section short rotations have many favorable features. By short rotations we mean one-year and two-year and sometimes three-year rotations. Good examples of short rotations are one-year rotations of small grains and lespedeza; two-year rotations of corn, oats and sweet clover with the sweet clover plowed under ahead of the corn; two-year rotations of small grain and sweet clover, or red clover; and three-year rotations of corn or sorgo, small grain and red clover. These rotations can be placed on land best suited to the crops used. They include a legume often—every year with the one and two-year rotations—and they make maximum use of the land. This type of short rotation maintains fertility and also adds supplementary pasture to go along with the permanent pasture.

The pasture should provide an adequate and uniform supply for spring, summer and fall use; and eight or more months for as many animal units—dairy cows, beef cows, or other livestock—as is practical for the size of our farm. No single grass or crop will give us a complete pasture season.

Next we will check our proposed cropping system for its productivity and erosion index. By working out this balance sheet in our Workbook we find out if our revised system is going to bring about an increase or a decrease in the productivity and fertility of our farm. Only by a system of farming that will produce a gain in fertility and productivity can increasingly and consistently high yields be obtained.

Another balance which is worked out and then put in the Work book is the crop production summary which will include the amount of hay, silage, straw and grain to be produced.

Likewise, in the Workbook, we work out an estimate of cash farm receipts with the revised system in operation, and cash farm expenses. Receipts are estimated, using the 15-year average price level from 1924 to 1939. It is felt that if a system can be worked out which will produce a fairly satisfactory income at these price levels, we are conservative and therefore are more likely to exceed than to go under our expected income.

After our proposed system has been checked and revised to get the best system we can figure out, we next plan on getting it into operation. We work out our revised cropping system, soil treatments, and a schedule of getting started field by field.

We also make a map of our revised farmstead layout and note possible changes, rearrangements for convenience, any new buildings needed and other improvements. A popular farmstead layout is one which makes use of the central court idea. With the central court, all buildings which are open on the court may be reached without opening gates. The central court has such wide adaptation it can be made to fit almost any farm.

A planning book for the home is also available, and much time, money and perhaps mistakes may be saved by having the home plan to refer to in carrying out the home part of the project. A food and clothing budget is included. The home and the land can't be separated on a farm very well, and the men are vitally interested in the home plan and understand it, and by the same rule the women appreciate understanding and knowing the farm plan.

Finally, a schedule of farm and home improvements which are needed to put the plan into complete operation is set up. With this schedule we can see the cost of the necessary improvements; which year they are to be made; and the time when credit will be needed, if any is required. Improvements are always based on the needs of the individual farm. Examples of improvements needed to make farm plans work would be a pure-bred bull, some milk cows, terraces, pond, milking barn and milk house, silo, lime, fertilizer, alfalfa seed, fencing, remodeled hen house, etc.

Home improvements might include a number of needs such as water in the kitchen and bathroom, built-in cabinets, electrical equipment such as a refrigerator, washing machine, etc.

The complete plan sometimes looks like a large order. This is true, but in developing our plan we have set up a goal towards which we are going to work. Also we have put each part of the plan in its proper relationship to other parts. We can see what should be done first and what is most important. Each improvement is made with a view to getting our entire plan into operation. Thus we have actually simplified our procedure. We have only to select and work out the individual parts of the program one at a time.

Several thousand Missouri farmers are now operating their

farms under a Balanced Farming system. Results are quite satisfactory. On many farms the carrying capacity of livestock has been doubled. One farmer on a 211-acre farm increased his herd of 15 beef cows to 40 beef cows in five years' time. Another farmer, on 160 acres, was able to increase from 10 milk cows to 20 milk cows, and his annual production per cow moved up from 240 to 419 pounds butterfat in a six-year period. Crop yields on all farms checked have increased substantially in amount and in dependability. A fifty to one hundred percent increase in the net income from the farm is the usual rather than the unusual experience of farm people who put balanced Farming into operation on their farms.

On all farms a lowering of the cost of production has been a result. One farmer is producing his corn needs on ten acres instead of using 20 acres. Another farmer who was always short of hay, pasture and grain from his own farm for his herd of 18 milk cows is now producing ample supplies of high quality hay, silage, pasture and almost enough grain.

Whether the future brings a need for increasing production or for decreasing certain kinds of farm production, or for decreasing costs of production, the farm family with a Balanced Farming system is in the best position to meet the changing conditions.

Like the farmer himself, the community also has a stake and a responsibility in Balanced Farming and better farming practices.

It is true that in many instances farmers have been taking more out of the land than they have been putting back. It is also true that the community as a whole has been taking more out of the community than was put back. Part of the result has been cheap food and a prodigal use of our natural resources. The people who farm and the people whose businessses are connected with agriculture, such as bankers, farm implement dealers, lumber dealers, feed and fertilizer dealers and many others who sell to farmers and buy from farmers, have an equal responsibility. All of us have been taking out without putting enough back.

Agricultural extension workers use several methods of helping farm people get started in Balanced Farming. Group meetings are held and individual farm visits are made. The Balanced Farm Management Association or ring is another method of getting folks going on Balanced Farming that seems to have distinct possibilities. In this setup the farmers who want additional

help want to move faster in putting a Balanced Farming system into operation on their farms, pay a part of the cost of extra technical assistance. Local business people subscribe a share of the cost and the Extension Service pays part of the cost. Usually about 50 farmers go together to form a Balanced Farming Association. They turn over the funds collected from the farmers to the sponsoring agency for agricultural extension work in their county. The business firms who have subscribed do likewise. These funds are used by the extension board to hire an associate county agent who will help them plan their Balanced Farming systems, and more importatnt, help them to get their systems into operation. Help is also given on keeping records and on income tax returns.

Balanced Farming is good farm management and family living all rolled into one. It is a complete job that involves livestock management, good crops, soil erosion control, building, planning, and farm and home improvements.

Balanced Farming is a system of farming and living adapted to the individual farm and farm family. It is the family's own plan. It is completely voluntary and therein lies its strength. Balanced Farming is different on every farm, and yet it works on all sizes and sorts of farms.

Nay, the earth hath no fruitfulless without showers or dews; for all the herbs, and flowers, and fruit, are produced and thrive by the water.

Izaak Walton,

And Now It's Sheep Fur

Condensed from Farm and Ranch

Bill Gray

GLOSSY "beaver" furs—grown on the backs of sheep! This is one of the seemingly miraculous conversions discovered by industry in the last few years, the processing of sheep pelts into flattering imitations of silk-smooth furs for ladies' coats, and it has opened a broad and bright new vista for the wool industry of the Southwest.

Wool, already holding its own in a heightening tug-o'-war with synthetics in catering to the clothing world, takes a long and aggressive stride in the newest development for its use. It even makes use of one of synthetics' choicest bits of sales appeal. The wool pelt, finished into a "fur," is called a plastic fur. It is equivalent to just that—the kink in the wool is gone, the "woolly" effect has been removed, and a sturdy, hair-like substance glistens in its place. To the non-expert, the converted pelt is a trim and expensive beaver and nothing less.

On the outskirts of San Antonio is one of the Nation's first post-war industrial plants, established at a cost of half a million dollars. It is turning out 10,000 converted pelts monthly for four coat-making firms in the New York area. All of the finished "furs" go direct by air express, so great is the demand. Fifteen thousand other pelts—not chemically processed for plastic conversion—come "out of the mill" at the San Antonio plant each month and are made into such garments as hunting coats, bedroom slippers, linings for children's snow suits, and toys.

But it is the plastic production that has drawn the interest and curiosity of the sheep producers of the Southwest. Half a dozen similar plants are in operation in the East, but the San Antonio firm is believed to be the only such plant outside of the eastern states.

Bernard C. Nelson, bringing from Boston to the Southwest his 20 years of lamb-pelt processing experience and a staff of five trained men, set up his enterprise in the "sheep country," hoping to develop an ample supply of suitable pelts within the region. Still purchasing many South American and Australian pelts because they have to be ex-

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ceptionally smooth, he reminds the sheep growers of the Southwest that "smoothing" up their sheep will net premiums. The plastic processing industry is still in its infancy, he believes, and in the future will be able to absorb countless thousands of select types of pelts.

The Corriedale breed of sheep comes in for a strong promotional boost in Nelson's program. He advises a strong crossing of the Corriedale on the Rambouillet to get the desired evenness in the pelt that is necessary in making the imitation furs. He looks to the day when he can buy hides and wool of Texas, New Mexico and Oklahoma sheep only, and not have to make his purchases across oceans.

Like a lengthy assembly line, the plant stretches out to include equipment and machines for more than 80 individual processes from the time the raw, salted down pelts enter the tannery until they leave for the airport in large bags to be flown to manufacturers.

In a huge revolving keg, the pelts are "drummed," first with sawdust and water and then with sawdust and naptha. "Staked," the pelts go into a process of leather softening and stretching, making the hide soft and pliable in the dozens of other later processes.

The next important treatment is a thorough brushing and combing of the wool that is to be fur at a point less than a hundred yards away. The pelt is then conveyed to a machine that buffs the leather side. Another specially made piece of equipment, a cylinder around which is a leather strap, beats the sawdust from the fleece and brings the wool pile up.

Sheared to an approximately desired length, the pelt then goes into the acidizing process where chemical compounds transform fleece into imitation hair. The solution that revises the structure of the wool is *brushed* into the pelt.

Many other processes stop the pelt along its six-week route from the rear part of the plant to the front entrance, where it leaves a finished product. There are dyeing, ironing, more shearing, more trimming and countless other tasks. You can't "make a silk purse out of a sow's ear" in a day, explains the plant manager, paraphrasing an old saying.

Expertly fitted together to give the impression that the coat is made from one large fur, the pelts usually are made up five to the coat by the eastern manufacturers. Generally they retail at $200, which is definitely in the fur range.

Technical resourcefulness from

the textile East has made it possible for the southwestern ranch woman to wear a fashionable "beaver" from her own flocks—provided her sheep aren't of the wrinkled variety.

In sheep, as in many other commodities, the premium is on smoothness. With a sheep's pelt, science can take up from there and go on to many other things if it can match a beaver's fur. And it has done that very effectively.

Scottish Agriculture

Robert Howie

A NUMBER of years before the war, when farmers in Britain were having their fair share of the world depression in agriculture, a well-known Scottish farmer was invited to Oxford to address a conference of English farmers and agricultural scientists. They had asked him to describe the methods in which he had been so notably successful in Aberdeenshire. After he had done so in his plain, direct fashion, he concluded his talk by telling his listeners that there really was no secret about successful farming; one had to decide upon the use for which one's particular farm was best suited, and then to drive hard with every means at one's command in that direction.

In the discussion which followed, an English farmer contributed a description of the kind of farm off which he tried to make his living. His landlord was unable to undertake any capital outlays, he said; the field drains and the water channels were out of order, much of the land was overgrown with rushes and waterlogged, the fences were useless, the buildings and roads were shocking—what would be the most suitable use for such a farm? In a flash he had his answer from the lecturer—"Keep snipe, and let the shooting to sportsmen!"

This farmer's reply illustrates, roughly, the realism which characterized Scottish agriculture in the present century up to the outbreak of the recent world war. I have often been told that primary producers in other parts of the world were much harder hit

during the period than we were in Scotland, and I think that is true. But I also think, looking back on those times now, that the majority of Scottish farmers faced facts squarely, farmed as well as they were allowed, adapted their methods to suit the times, and made progress which has been advantageous to Scotland.

Briefly the facts were that, whilst we had the market for our produce at our door, we had to face competition for that market of food surpluses from many lands, unloaded at prices which we knew could not have been anything but ruinous to the growers in the countries concerned. That market, too, was composed of urban consumers, the mass of whom were far from being affluent, for the numbers of them who fell out of work often constituted over five per cent of the whole population. Moreover, the moneyed part, at least tended during the period to drift to the south of Britain.

There was no real national direction of agriculture, such as the Danes, the Swedes, or the New Zealanders had. The state, it is true, granted us a subsidy or two on occasion, and we were also allowed to remain a very coddled section of the community in regard to taxation. But such things are but governmental confessions of being lost. On the other hand, we must in fairness admit that we had against these inhibiting factors the counter-advantages of a climate, a soil, a latitude and a general altitude which most certainly favor the growing of pastures, and which promote the production of hardy and healthy native breeds of livestock to graze these pastures.

At the same time, it was abundantly proved with the passage of time that, in the more arable counties, these same physical features of Scotland were ideal for the production of disease-free stocks of agricultural plants. All these things need to be remembered, as they shed much light both on where Scottish farming was going during the past forty-five years, and the point it has presently reached.

In the Highlands of Scotland, we see the bad effects of Scottish realism. That area was not consciously devoted to "keeping snipe," but a lot of it was devoted to the red deer, and the privilege of shooting these animals was purchased by wealthy men from London or from abroad. The use of 3,500,000 acres for that purpose, out of Scotland's total surface area of 19,000,000 acres, was a chastening thought, and was only partly mitigated by the fact that a proportion of these deer forests

was useless for either agriculture or forestry.

A lot of the remaining hill-land which was actually devoted to sheep was not much better. Occupiers of these hill-land areas have really inherited the results of the "realism" of their early nineteenth-century predecessors who, through economic stress, substituted large sheep ranches for the numerous little cattle-raising crofts with common grazings on the hills. Exclusive shepherd-and-dog farming, putting nothing back to the land to compensate for the removal of annual increments of mutton, bone, and wool, refraining from keeping cattle because this means labor in the provision of winter provender—that kind of farming eats its own tail. The grazings progressively deteriorate; it is virtually a Scottish example of soil erosion which has been more gradual and will be more difficult to arrest than in other instances elsewhere in the world.

The Scottish administration has now, at long last, come out with a scheme for rehabilitation of hill-land farming—one in which the occupiers and the state will be partners in planning and capital outlay. But agriculture is only part of the problem. Afforestation—it is intended to plant over one-fifth of Scotland—hydro-electric developments, the tourist, and suitable light industries, transport, and even sport itself, are all interlocking agencies of equal importance in achieving the common end—rejuvenation of human life in those areas.

In our best arable districts, which are really not extensive in Scotland, I do not think that the economic adversities and the wars of the present century have caused the slightest lowering of standards. One sustaining thought has been that if arable farming could not pay there, it would not pay anywhere, and there is a well-known rule for taking a long view if you farm this good land—"If you lose money one season, go look for it where you lost it the next season." Every avenue of opportunity was, therefore, searched to reduce costs and increase yields.

The yields of cereals, potatoes, swedes have gone up vastly—oats, for example, about an average seventy-two bushels per acre in 1900 to about ninety-six bushels now. American machinery which was suitable for Scottish purposes has always been sought—as one would expect from a country which introduced the first reaping machine and also the first threshing machine in the nineteenth century.

The Scottish Department of

Agriculture has vigorously prosecuted a potato-crop inspection and certification scheme, so that successful growing of this crop in England depends on the planting of Scottish seed potatoes. The National Society for Research in Plant Breeding is engaged at the moment in trying to evolve a new potato variety which will be resistant to the common diseases, and wild species of the potato family indigenous to Mexico and Peru are being used in the parent stocks. In cereals, the search is for high-yielding, high-quality varieties which will stand up on our fertile soils and under our summer rains. And as for grasses, which we consider to be Scotland's most important crop, even before oats, there is no end to the lines of research which are being conducted.

On the second-class land, livestock is, of course, the sheet anchor. The great annual sales at Lanark, Perth, and Kelso have world renown, for many notable animals are purchased there by buyers from all over the world. We would be foolish if we allowed our very best specimens to go abroad, but these exports are becoming exceedingly valuable and important to our national economy. The qualities of our pedigree breeds are not determined so much by export demand as by the needs of farmers at home trying, as they always must, to satisfy what, up to the last war, was an exceedingly discriminating British market.

Whenever home requirements cease to dominate Scottish pedigree breeds of livestock, their intrinsic merits, which make them sought after by overseas breeders, will have disappeared.

Dairying has been increasing in Scotland because it was often the one and only line of production which was profitable. Scottish milk producers at the end of the 1914-1918 war found that it was a very "chancy" business. It seemed that the summer supplies were invariably too big for the demand, and they felt that the distributors were using this fact as a lever to reduce prices inordinately. So they formed a milk pool, with the idea of keeping the summer surplus off the market and manufacturing it.

The pool failed because not by any means all the producers were in. But the Marketing Act was passed in Britain in 1931, and Scottish milk producers immediately tried again and formed the hundred per cent membership Milk Marketing Board. It was the first of its kind anywhere, and has been entirely successful. In the recent war, and since, the Board and its English counterpart have been potent forces in

helping to carry out the state policy of full nutrition for all and fair distribution.

A Scotsman is at the helm of the World Food and Agricultural Organization today—Sir John Boyd Orr. He has studied the principles of human nutrition at a Scottish agricultural research station, and has epitomized Scottish ideals of a fair distribution of available food supplies throughout the entire world. However successful he may be in leading the nations to a common purpose, Scottish farmers feel that his is the only solution to the problem of obtaining a stable but not necessarily over-abundant food production.

Mow Your Lawn Correctly

Condensed from the New England Homestead

William H. Lachman

Massachusetts State College

Most folks mow their lawns so that the cut grass makes a series of paths which are quite evident for several days after the lawn has been mowed. To me, this makes a very unsightly lawn, and, I have often heard others remark that they did not like to see dry dead grass lying in paths across a large expanse of lawn.

This effect need not be the result of mowing your lawn if proper attention is paid to the manner in which the grass is cut. I have noticed that most everyone travels back and forth in shuttle fashion when mowing their lawns until a particular section has been mowed. Most lawn mowers are made so that the grass is thrown to the left while they are in operation. Shuttle mowing thus leaves a series of wind-rows that make for the pattern effect.

If the person doing the mowing would push the mower around the border of the area to be cut in a clockwise direction, the cut grass is evenly distributed over the lawn and no pattern is left. It is just as easy to mow in a square or rectangular fashion as to travel back and forth. Special care should be taken not to mow in a counter-clockwise direction, however, since the cut grass in this case will be thrown to the left on the uncut portion of the lawn. The grass clippings build up on the grass to be cut and this makes it increasingly difficult to push the mower.

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The Use of DD for Soil Fumigation

Condensed from Texas Farming and Citriculture

George H. Godfrey

Plant Pathologist, Valley Experiment Station

SEVERAL new soil fumigants have appeared on the market recently. One of these, originally a by-product in the petroleum industry, is a mixture of equal parts of dichloropropane and dichloropropylene, and is commonly referred to as "D-D" or "D-D Mixture." It is now being manufactured for use in soil fumigation, and it has attained wide popularity and extensive commercial use in Hawaii, California, and for specialized high-income crops in Texas.

D-D is a heavy black liquid, weighing about 10 pounds to the gallon. It is capable of practically complete volatilization. Its fumes penetrate through the soil and kill nematodes, injurious soil insects, and many growing weeds (but not weed seeds). When applied under correct conditions, good pest control has been obtained in Texas. In a soil heavily infested with root-knot nematodes, the infestation was greatly reduced. Cabbage yielded 2½ times as much in the treated as in the non-treated blocks. With squash, nematode infestation was reduced 70 per cent and the yields were increased 18.5 per cent by field applications. Tomato roots showed 80 per cent fewer nematode galls and gave 20 percent higher yields in soils fumigated with D-D at approved rates of application. Snapdragons grew to more than double the height, produced longer flowering stalks, and flowered longer in treated than in non-treated rows. In commercial gladiolus plantations at Linn, Texas, greatly increased yields of cut flowers and nematode-free corms have been produced in soils fumigated with D-D.

However, extensive experiments with D-D have shown it to have limitations particularly as to conditions of the soil at the time of application of treatments. The soil must be well prepared in advance of treatment. It must be deeply plowed, as the gas, in diffusing outward from points or lines of application, takes the path of least resistance and will not penetrate deeply enough be-

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April, 1947

neath a shallow plow-sole to reach the soil zone where most of the nematodes are found. Plant debris from a previous crop should be well rotted, and cultivation should be thorough enough to free the soil from large, heavy clods. The soil must be neither too wet nor too dry, and neither too warm nor too cold. When the soil is wet and cold, the material will not penetrate well and it may remain in the soil too long to permit planting of a crop with safety for 30 days or more. If it is too hot and dry, volatilization and escape from the soil will be too rapid and soil organisms will not be killed. Under conditions favorable for reasonably rapid escape of the gas (loose, slightly moist, warm soil) planting can usually be done 10 days to two weeks after treatment. Damage to crops by planting too soon after treatment has been frequent. Poor results in nematode control have frequently been obtained when one condition or another has been unfavorable.

The conditions favorable to good results from soil fumigation are easy to recognize and understand. In the course of the year there are always some periods when best results can be attained. The ideal condition is a deeply prepared, loose slightly moist soil, not cooler than 55 or 60 degrees F., and preferably not warmer than 80 degrees, at the depth of application. A wet soil surface following fumigation serves to seal the fumigant in the soil and drive it downward, thus extending the range of its effectiveness. Outstanding results have been obtained when a light rain has followed the application. In the absence of rain, a light sprinkling, wetting the soil to a depth of 3 inches, will bring the same favorable results. For large-scale field operations, a rain machine (overhead sprinkler) is an effective substitute for rain. Compacting the surface soil with a roller or drag serves the same purpose, but somewhat less effectively.

D-D may be applied in small home garden plots and seed beds by pouring measured quantities into the bottoms of holes punched in the soil to a depth of 7 inches. About 10cc. (⅓ of a fluid ounce) in holes spaced 18 inches apart usually give good results. One teaspoonful in holes 12 inches apart is also practical. Nursery applications may be made with the hand-operated injectors of which there are several different types developed by the fumigant manufacturers. In all cases, it is important to close the injection hole in the soil by pressure with the foot. For large field-scale treatments, tractor-drawn machine applicators of various kinds

have been developed. Rates of from 300 to 400 pounds of D-D per acre appear to be necessary to get good results under Lower Rio Grande Valley conditions.

For high-income producing crops, home gardens of ornamentals and vegetables, and nurseries, losses due to nematodes and other soil infesting plant parasites can be greatly reduced by judicious applications of D-D in the prepared ground well before planting. Nematode control by soil fumigation never has been 100 per cent effective under field conditions. If the crop following a treatment shows some nematode infestation of the roots, the nematode population will build up subsequently on any susceptible crop that is planted. Therefore another treatment will be desirable a year, or at most two years after the first treatment. D-D cannot be safely applied closer than three feet to the roots of living plants and shrubs.

Saves Sweet-Potato Vines

A sweet-potato vine harvester devised by the U. S. D. A. may make it possible to save sweet-potato vines as feed.

Tested in the field for the last two crop seasons, the new machine did the harvesting job at the rate of a half acre an hour and in a heavy crop handled 10 to 20 tons a day with a light tractor. The harvester consists of two main parts and is inexpensive to build. Two 8-inch rolling coulters and a pair of 32-inch Texas-type half-sweeps are arranged to cut the tangled vines apart and free them from the ridges 1 row at a time. A cast-iron wheel 15 inches in diameter with a 5-inch tread rolls just behind the sweeps and presses the vines down to facilitate cutting action of the sweeps.

When freed, vines are picked up on a 12-inch drum with 4 sets of disappearing fingers which deliver them to an elevator for carrying into a trailer pulled behind the harvester.

Capper's Farmer

"Airplane Poison"

Condensed from Holstein-Friesian World

Jack Bailey

ACCORDING to a gag, airplane poison is the most deadly of all, because one drop is fatal.

At the drug-store it is called hydrocyanic acid. But it is more commonly known as prussic acid. On the dairy farm, it is often unrecognized beyond the vague "something the cows ate that killed them." The murderer is sometimes hard to convict, as it was one summer when I was a boy on the Wisconsin home farm.

During an exceptionally hot part of the summer, dad decided to clean out a particular "fence row" in the cow pasture. He reasoned that the heat would aid in permanent destruction of assorted weeds, chokecherry bushes, brambles and saplings that were flourishing there. The cows, of course, were soon attracted by our activities. The leafy portions of the mess were tossed over the fence so the cows could eat the ones they preferred. To make a long story short, three of the cows died across the fence from us that afternoon. They just staggered a little, started panting and frothing at the mouth, laid down and died. Dad thought it might be the heat. No plants were involved that the cows had not been eating since they were calves. Anyway, we kept the rest of the brush on our side of the fence.

Some years later, as a young man in Kansas, I helped drag sixteen range cows out of a sudan grass field that they had broken into. In this case, there was no question about what had killed the cows. The same thing had evidently happened before on that particular ranch. It had been a dry, hot summer, the sudan grass was short and stunted looking. "Prussic acid," explained the superintendent. "Drouth always makes sudan grass poisonous for some reason." It was some years later that I found out what the reason was.

In Leaflet No. 88, the U. S. Department of Agriculture lists eight common and widely distributed plants that may cause prussic acid poisoning. The list includes sudan grass, Christmasberry, flax, Johnson grass, arrow grass, sorghum, wild black cherry

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and chokeberry. There are many others not so well known.

These plants are all alike in one respect. Under normal conditions, there is little, if any prussic acid present in them. However, and this is the joker in the deck, they do contain two other compounds: the glucoside, amygdalin, and a ferment, emulsin. These two combine to form prussic acid when conditions are right, though each is harmless alone.

According to Milks Veterinary Pharmacology, prussic acid develops only when the normal growth of the plant has been stopped or interrupted. Factors would be cutting, wilting, drouth, frost, trampling, bruising, etc. And therein lies the answer to why our cows died along the fence when I was a boy.

The wilted chokecherry leaves contained already formed prussic acid, due to the combination of the glucoside and ferment. As a result, the cows died. The other cows evidently had not had a chance to eat of the fatal leaves, or at least not enough of them. Eating the green leaves of growing chokecherries had never harmed the animals because those leaves had not contained prussic acid, just the two uncombined compounds. Prussic acid was not formed in the stomachs from the green leaves after chewing and bruising because of the many factors in the paunch that retarded prussic acid formation. A few such retarding factors are glucose, starch, alkalinity, and some feeds like alfalfa hay and linseed cake.

The business of why the Kansas Shorthorns died when they broke into the sudan grass becomes complicated. First of all, it raises the question of why cows do not always die when they break into sudan grass fields, especially drouth stricken crops. Let's see what the experts say.

To begin with, there's the stage of growth to be considered. According to the Wisconsin workers, the cyanide content is highest in the earlier stages of sudan grass growth. They believe drouth is a factor only when the plants are short and dark green. Because of the drouth, the plants are unable to grow beyond the high cyanide content stage, and remain poisonous for much longer periods than usual. So far, no one has succeeded in furnishing a better explanation. This theory applies to all of the cyanide forming or cyanogenetic plants. In line with these findings, they recommend that sudan grass be at least eighteen inches tall before being pastured. The cyanide content at this stage is so low as to no longer be dangerous. Many other workers support the

belief that cyanide content is much lower in mature plants than in young ones.

Then there is the matter of soil fertility, as a factor. It has been amply demonstrated that plants grown on poor soil contain more cyanide than those grown on good soil, if the nitrogen is relatively more plentiful than phosphorus. The Nebraska and Wisconsin workers agreed that nitrogen increased cyanide content, that phosphorus decreased it, and that potash had no effect on it. These results were only applicable to young plants, and the increase by phosphorus addition is attributed to more rapid growth past the danger stage. In this way, nitrogen was used up for plant growth that might have accumulated to form prussic acid forerunners. The nitrogen did not increase cyanide in older plants. The results would suggest a carefully balanced fertilizer program for cyanogenetic plants.

In the course of experiments, many questions have been accurately and correctly answered. A few sample questions are listed:

Why does frost make sudan grass poisonous?

Is second growth more poisonous than the first?

Why is hay nonpoisonous, when plant growth has been stopped?

Is it safe to make silage out of cyanogenetic crops?

The answers to these and a host of other questions are all derived from the work on the stage of growth and the influence of soil fertility. Let's have a look at those sample questions.

Manges, of Kansas, believed that frost increased the cyanide content of sudan grass, but the Wisconsin workers disagreed with him. Their experiments showed that there was no change after freezing. If frost came on a short new growth where the cyanide content was already high, it would be equally high after frost, and capable of killing cows. Or, if favorable weather were to follow a frost, the plants might send out new shoots high in cyanide, and they, too, might kill livestock if eaten. In either case, it might easily be deduced that the frost had made the plants more poisonous, but such a belief is erroneous.

Much the same answer may be given to the second question, for a succeeding growth is not more poisonous than the first growth at a similar stage. In both cases the short, dark green, young growth is apt to be high in cyanide, which decreases as the plants attain growth.

The question on hay is answered, too, by referring to the age of the plants. As a rule, su-

dan is not cut for hay until it is well above eighteen inches tall, by which time the cyanide content is low. For a time it was believed that air drying and sun curing reduced the cyanide content of the cyanogenetic plants. Repeated tests, however, have shown that this is untrue. If the plants were high in cyanide at cutting time, the resulting hay was also shown to be high in cyanide.

The same results have been noted in regard to the ensiling of such plants. The acid reactions of fermentation do not decrease the poisonous capabilities —at least not for several weeks after ensiling. Acharya reported a greatly decreased cyanide content of sorghum two months after ensiling, but practically speaking, it would be dangerous to ensile short, immature cyanogenetic plants. When mature plants are used, there does not seem to be any danger.

In conclusion, it might be well to summarize the findings of the various workers in the form of a number of "don'ts."

1. Don't pasture short green cyanogenetic plants.
2. Don't pasture until plants are eighteen inches tall.
3. Don't use nitrogen fertilizer alone on a phosphorus deficient soil.
4. Don't pasture fields too short, thereby increasing percentage of new growth being eaten.
5. Don't cut short plants for hay.
6. Don't take chances with suspicious fields—have plants analyzed or try out less valuable animals.
7. Don't neglect to combat drouth by fall or early spring plowing—cultivation if necessary.
8. Don't ignore new second growth after frosts—it's dangerous.
9. Don't laugh at "airplane poison."

Community Improvement Contests

Condensed from Better Crops with Plant Food

S. Fletcher Sweet

Agricultural Extension Service, University of Tennessee, Knoxville, Tennessee

COMMUNITY improvement through concerted community action is on the march in Tennessee, with more than 25,000 farm families in organized improvement contests last year. The State is now covered by such contests, and both the sponsors and the contestants agree that the sky is scarcely the limit.

Improvement contests in Tennessee are relatively new, although the community organization is now a grown-up baby of the Agricultural Extension Service, University of Tennessee. With a majority of the communities in every county of the State already organized, the strong green light was thrown upon community improvement when civic clubs in various trade areas started giving prizes for the best improvement jobs.

This started in 1944, through cooperation of 10 civic clubs and organizations of Knoxville. These groups, realizing what a dressed-up East Tennessee would mean with respect to the millions of visitors coming to the Smoky Mountains National Park, now leading the country in the number of visitors, offered the first community prizes. The East Tennessee Community Improvement Contest was on its way, covering the hills and valleys from the Smokies to the Cumberland Mountains.

The following year the Farmers' Club of the Nashville Chamber of Commerce started a similar contest, covering 38 counties of the Central Basin, with its rolling lands, dairying, tobacco growing, and generally diversified farming. And in 1946 the civic organizations of Chattanooga launched the Lower East Tennessee Improvement Contest, covering 11 Tennessee counties and two in Georgia. Since the Memphis Commercial Appeal had sponsored the Plant-to-Prosper contest in the cotton lands of West Tennessee for some years, the State was now covered with an organized upsurge for improved living—better homes on better farms.

Sectional and local sponsors contribute a total of about $10,-

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000 in prizes for county and area winners. It works this way: An elimination race is sponsored by some local organization in each county. The winner from each county is then entered in the area contest to compete with winners from other counties for the various prizes and the sweepstakes.

Here is how community leaders about such contests, as expressed by Ralph Shanlever, chairman of the Dutch Valley community organization in Anderson County: "Cash prize or no cash prize, we should enter the contest," young Shanlever, a real dirt farmer, said. "We have found that our community must work together to get anything it wants. The improvements we make in our homes and on our farms will be lasting gains, whether we win a prize or not."

The Dutch Valley group of about 50 families voted unanimously to enter the contest; and although 1946 was their first year in the race, they placed high among the 21 competing counties of their area.

Since scoring in the contests is based upon improvement in farms and homes, the Tennessee Agricultural Extension Service cooperates closely with communities in improvement programs which the organizations themselves draw up. Many Extension specialists help with judging throughout the State.

Here is the contest pattern adopted by the Knoxville civic organizations, in launching the East Tennessee Community Improvement Contest in 1944: Scoring is based upon 1,000 points, divided as follows: 200 points on home food supply; 200 on maintenance and improvement of soil fertility and feed production; 100 on development and improvement of appearance of home and farm; 100 on conveniences and liveability of home and farm; 400 on community organizations and development.

Practically the same outline is used in the contests sponsored by the Chattanooga and Nashville groups. The Plan-to-Prosper contest is based more upon individual accomplishments.

Are the results justifying the efforts and prize money? More scattered examples of the work done show that one community took as a major project the elimination of all but registered bulls on the farms of that community; another organized an unique recreation program; many built community houses; one community sponsored a State farm tour in search of better farming practices; another concentrated on reclaiming farm lands; one encouraged G. I.'s to enter farming and to develop

sound farming systems. There is no full count at hand now of the schools and churches assisted and improved, the buildings painted and repaired, or the tons of fertilizer used. A few individual examples will show what this amounts to on a statewide basis.

Leaders of the Buffalo community in Grainger County sat down in January and made their plans for the year. They listed all individual and community farm problems, and needed home improvements. Chairmen were appointed to push each phase of work. The dairy chairman checked on herds, pastures, and production; the Four-H Club leader checked on that work; and the field crops chairman worked accordingly. County and home agents were called in for advice on how to meet farm and home objectives.

As a result, Buffalo was practically self-supporting in the matter of feed, reducing the amount of hay bought by 92.5 per cent, and the amount of other feeds bought by nearly 75 per cent—this, despite a healthy increase in the number of work stock, beef cattle, dairy cows, hogs, sheep, and poultry. It was done through increases of 9 per cent in small grains, 14 per cent in winter legumes, 40 per cent in alfalfa, and good increases of other home-grown feeds and pastures.

This community noted that 91 per cent of its families grew and conserved 75 per cent or more of their food needs. In addition to the home food supply, families filled hundreds of jars and cans for the school's hot lunch program. Buildings were painted, lawns seeded, fences built, home equipment bought, ad infinitum. Multiply this by about 400 competing communities, over the State, and the result reveals the actual progress made.

It is obvious that each community had plenty to do, since the judging was to be on improvement over the year before. Prosperous communities had no better chance of winning than less prosperous ones. Barren Plains, a well-to-do Robertson County community, reported the replacement of scrub bulls with registered sires. Barren Plains also constructed a community playground, fully lighted and equipped for all ages.

Twin Oaks, in Putnam County, among other things furnished labor and materials to improve the school grounds, putting a good road through the premises. Twin Oaks leaders also saw to it that all barns and outbuildings were painted. A half-dozen eroded and practically waste farms were put back into cultivation.

Problems differed almost as

widely as there were contestants. For example, Berry, a Wayne County community, started the shift from straight cotton with no winter cover, to a point where practically every cotton acre is in vetch. Alfalfa and small grains also were given impetus.

Then there is the prosperous community of Van Leer, in Dickson County. This group emphasized kitchen improvement and started a community cannery.

Everywhere, home improvements have been high on the list. The total adds up to a lot of communities which are now better places in which to live. It is anticipated that even more will be accomplished through the State in 1947.

There is no problem in human relations which men of good will cannot solve.

The duty of man is not a wilderness of turnpike gates through which he is to pass by tickets from one to the other. It is plain and simple, and consists of but two points. His duty to God, which every man must feel; and with respect to his neighbor, to do as he would be done by.

Thomas Paine

An Old Fiber with a Future

Condensed from Nation's Business

Eric Morrell

How would you like a suit that is light in weight, cool in summer, warm in winter, soft to your touch, as smooth in texture as a fine French cashmere and yet not likely to wear out in all the years you might use it?

I've had a suit like that. It wore for years. It was dry cleaned innumerable times and even tossed into the laundry that went through our ordinary washing machine. The older the suit got, the better the material felt —it just kept getting softer and silkier. It kept its shape. I didn't keep mine—otherwise I suppose I'd still be wearing it.

The suit was made of ramie.

You may never have heard of ramie, but probably you've seen it. The old Welsbach inverted gas mantle was made of it. Ramie is said to be the oldest fiber used by man. It is the strongest vegetable fiber known; stronger wet than dry. It absorbs moisture and dries more quickly than cotton. It has high resistance to mildew, is almost unaffected by sea water, and has virtually no shrinkage. And, in addition, it dries well. It's colors have unusual depth and brilliance.

There's a good possibility that within the next few seasons you'll be offered ramie when you look for fine fabrics—in suits, dresses and other apparel, in floor and furniture coverings, perhaps even in bandages and table linens.

Despite the obvious qualities of ramie and its long history of use as a fabric in ancient Egypt and in the Orient, it has failed so far to find a market in this country. This is due to the difficulty of preparing the fiber for spinning.

It's a matter of jawpower.

Most of the ramie being produced in the world today is grown in China. The fiber must be separated from the plant stalk, the gums and pectins that coat the fiber removed.

For centuries the Chinese have been processing the plant by chewing bits of the stalk, or laboriously separating and cleaning the fibers by hand. They attracted interest as a

Reprinted by permission from the Nation's Business, January, 1947

That part of the crop not used in China generally is exported in the separated, but not degummed, state in which it is known as China grass. In America's machine-age economy the processing by hand was impractical. The supply of American ramie was almost non-existent, so machines that could do the processing economically were not developed. Repeated attempts to establish a ramie industry in this country failed.

Meanwhile the industry flourished in the Far East. In 1936, Japan used 40,000,000 pounds of China grass, most of it imported from China. The fibers were used for sailcloth, fishing nets and other marine uses. Its success is indicated by Japan's China grass production, which rose from 3,300,000 pounds in 1937 to about 10,000,000 pounds in 1943.

In England, the Yorkshire Ramie Spinning Company has been producing ramie yarns on a limited scale for more than 40 years.

Ramie first was introduced in the United States in 1885, when Dr. George C. Shaeffer, then librarian of the Patent Office, transplanted a few plants from Java to the Botanical Gardens in Washington.

They attracted interesst as a possible farm product, but it was not until the turn of the century that there came a flood of processing machine patents and the subsequent failure of these machines to turn out a commercially successful product.

Despite the failures there has been constant experiment that has kept in motion a small ramie production in this country.

The suit I mentioned earlier was made from American produced and processed ramie, as was the half-ramie, half-wool scarf I've worn for years.

In my own experiments with this scarf, incidentally, I've washed it, boiled it, taken it from boiling water and plunged it into cold water, all to see what effect such treatment would have. The only effect I've found is that the scarf is as good as it was eight years ago.

German action in cutting off the U. S. Navy's badly needed supply of Belgian flax for packing gave ramie a big chance in America.

After testing packings made of ramie in lieu of flax, Rear Admiral T. A. Solberg reported highly satisfactory findings.

This experience created interest in ramie at the Johns-Manville Corporation which made the test packings for the Navy. Johns-Manville decided to continue its investigation. Since packing manufacture involves

much textile equipment. and many methods, its research reaches into the fabric field.

Other experiments are being conducted by Newport Industries, Inc. In cooperation with the United States Sugar Corporation, they are working on the production of ramie fiber as well as its processing. They are growing 1,000 acres of ramie and plan to put another 500 acres into production.

Newport used half a dozen small machines to separate the fiber from the stalk, and is replacing these with a larger model expected to be capable of handling the production of 1,500 acres yielding three crops a year. The company is planning a plant to dehydrate ramie tops and leaves for cattle feed, and to salvage and utilize as by-products the gums and pectins that coat the fibers.

Another type of separating machine has been developed by Sea Island Mills, Inc., which has been experimenting for several years with ramie for textiles. They have studied the planting, growing and harvesting of ramie on a 500-acre plantation, and the relation of these processes to the characteristics of the fiber in subsequent separating, degumming, spinning and weaving.

Their separator, or decorticator, as the machine is known in the trade, is built as a mobile unit for use in the harvested fields. The plan is to have such separators distributed so that growers having 75 acres or more of ramie may process their own stalks.

So far Sea Island has processed about 25 tons of fiber, most of it from its own plantings. Part of this output has been woven into fabrics which were made into garments and sold in stores in 18 large cities. Sea Island mills is believed to be the only firm at present engaged in the commercial production of ramie fabrics in the United States.

An official of a large furniture store in Boston became enthused after trying out ramie fabrics.

"It would be wonderful for upholstery, rugs, bath mats, drapes and a lot of other things" he told me. "If we could be sure of getting an adequate range and supply of fabrics we would put in a complete floor of ramie."

If this Oriental cloth is to become widely used in this country, it must start at the beginning as an American product. High speed machine methods that lower costs must have uniform materials. The product of crude hand labor in the Far East lacks this required uniformity. So an American ramie industry must start at the farm where proper planting, cultivating and harvest-

ing could produce the necessary quality of raw material. The plant requires a warm climate, well-drained soil and moderate rainfall.

Among today's pioneers supplying researchers with decorticated ramie fiber is the Florida Ramie Products Company, Inc. A. C. Kidd, company president, has announced that the firm will expand its operations to cover the harvesting of 2,800 acres of ramie in 1947.

Others are growing, processing, spinning and fabricating ramie on a small but hopeful scale from Florida to California.

One Man Silo Filling

Condensed from Electricity on the Farm

Ed Forest was one of the first farmers to build a grain elevator to be operated by a fractional horsepower motor. He did such a good job that his neighbors had him build elevators for them. He built so many that elevator building and elevator parts is sort of a side-line business with him now. Then in August 1944 he invented and built a wagon unloader, using the principle of the quarter-horsepower elevator.

Several years ago, when Ed was in a silo filling ring, he was the oldest man in the ring—60. Some of the men who drove tractors got around faster and had time to rest. But Ed drove mules. He would drive five miles to and from his neighbor's farm. Then he would drive, drive all day long in the field. There was no time for him to rest at silo filling time. So Ed got out of the ring. He put his head and hands to work rigging up his own filler. Now he fills his own silo all by himself. There is no waiting his turn. No corn cut down in advance to get muddy after a rain. Mrs. Forest has no silo crew to cook for. And the bill for gasoline to fill the silo had been $14.15. With the motors, the regular electric bill went up just $2.25.

This is the way Ed fills his silo. He has a Papec 14-inch cutter that is driven at about 425 rpm by a 3 hp. motor. He thinks a 5 hp. motor would do the job a little better. The cutter can run at that low speed because the blower elevates the silage only about 10 feet into the hopper of a long conveyor elevator which is separately driven by its own 1 hp. motor. The cutter is located against a wall inside the barn. The conveyor extends up

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August-September, 1946

through the roof of the barn and over the edge of the silo at an angle of about 60 degrees with the horizontal. Another item in the outfit is a home-made low rack. It is only 16 inches above the ground at the rear and 22 inches at the front and is 18 feet long. That makes a large load possible without much lifting.

The low rack enables him to cut corn and load it easily onto the wagon without an assistant. Cutting the corn right onto the wagon has another advantage. It does not get down into the dirt and pick up grit that dulls the cutter knives more than the corn does. Because of that he sharpens his cutter knives only three times while filling the silo. He drives the low rack into the barn alongside the cutter and feeds directly from the rack. Without working too hard he puts in four loads of corn per day.

Filling his silo also takes less time than workng with the silo ring. There's less traveling to do. Then by the time the silo is full it has settled enough so he has put an extra acre of corn in it. Not everyone can use Ed's method of filling the silo. There are some things to think seriously about, however, in his system. The conveyor, for instance, takes much less power than the blower for elevating the corn. Such an elevator might be an excellent piece of equipment where field choppers are used.

Here are some things you should do:

1. Keep the cutter knives sharp. That may mean sharpening once or twice a day when running continuously.

2. Have knives set as close to the strike plate as possible without touching it.

3. Run the cutter slow—no faster than necessary to blow the corn to the required height. It is the blower that takes the power in an ensilage cutter, and the power goes up with the *cube of the speed.*

4. V belts will save power. Or use a flexible flat belt not more than 4 inches wide with a motor pulley at least 4 inches in diameter. Larger pulleys mean less slippage and more power transmitted by a light belt because it travels faster.

5. Feed the cutter uniformly and do not crowd it.

6. With an electric motor, be sure your voltage is up where it should be, *when the motor is running.* Small wires or long runs from the transformer may get you into trouble from voltage drop, with loss of power. Adequate size of wires and switches is important.

7. Have the motor properly oiled and in good running condition.

Control of Necro

Condensed from American Hampshire Herdsman

J. L. Krider

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FIRST we might ask, what is "necro" or necrotic enteritis? Is it the same as or different from "pig pellagra," which is the disease produced when the vitamin niacin is lacking in the feed?

The type of necrotic enteritis observed on hog farms is commonly considered to be a filth-borne disease due to certain types of bacterial infections, although it has been noted in herds kept under sanitary conditions. The disease is characterized by the same general external symptoms as "pig pellagra." The latter disease is accompanied by diarrhea, dermatitis, nervous disorders, and a loss of appetite. When the affected pigs are posted there are hemorrhagic lesions in the lining of the stomach and small intestines, congestion and swelling of the small intestinal wall, and ulcers of the large intestines. The pigs that die are very thin from loss of weight, have rough, scurfy hair coats, and show a more or less rough skin condition called dermatitis. "Pig pellagra" may be cured by feeding or injecting the vitamin niacin (nicotinic acid).

The symptoms observed in an attack of "necro" are similar to those observed in "pig pellagra" except that the sickness due to "necro" is usually accompanied by an increase in body temperature and refusal of feed.

Under field conditions it would be unusual to find an uncomplicated deficiency of niacin in pigs. Workers at the Michigan Experiment Station have concluded from their tests that niacin might be of considerable importance in the prevention and cure of necrotic enteritis. When they fed niacin and fresh liver to affected pigs they obtained favorable results as a cure and preventive of necrotic enteritis which was produced by giving the pigs bacteria that causes necro.

In more recent tests the Michigan experimenters observed that many pigs died from the initial attack of the disease regardless of the supplements fed. However, during the recovery period liver and niacin were of benefit in producing more rapid gains and

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decreasing the time required for recovery.

Experiments at the Ohio Experiment Station indicated that niacin did not have enough protective value against necro infection to recommend its use as a specific preventive or curative measure. Their results did not agree entirely with those obtained at the Michigan Experiment Station.

It is generally conceded that this bacterial disease occurs as a secondary complication resulting from the invasion of the intestinal wall by commonly occurring micro-organisms and not as a primary infection, as commonly supposed. When a ration is deficient in some essential nutrient such as niacin, the pig is more susceptible to attack from "necro" and other diseases. Many of the bacteria identified or associated with "necro" are normally present in the intestines of many healthy pigs and have been identified in parts of the carcasses of slaughtered animals.

It should be remembered that intestinal inflammation may be the result of other factors besides possible niacin deficiency. Infection, unsanitary conditions, complications due to the double treatment of vaccination for cholera, etc., may be predisposing factors. Especially for drylot feeding care should be taken in selecting proper feeds so that niacin and other B^2 vitamins will be present in the rations in adequate quantities.

Some knowledge of the niacin content of feeds may be helpful in formulating rations that supply enough of this factor. Corn is one of the poorest sources, containing 6 to 7 milligrams of niacin per pound. Milk products have about 4 to 6 milligrams per pound, while soybean meal contains 17.6 milligrams per pound. Tankage and meat scraps probably now contain less glandular organs than formerly because of greater present demands for liver and glandular materials for human consumption. Tankage contains 20 to 30 milligrams of niacin per pound and meat scraps contain about the same amount. Sun-cured alfalfa leaf meal contains about four times as much niacin per pound (24 mg./lb.) as corn. Fish meal, alfalfa meal, dried distillers' solubles, yeast, liver meal, distillers' grains with solubles, wheat middlings, wheat bran, and sunflower seed meal are good sources of niacin. A protein supplement for drylot feeding of young pigs (under 75 pounds) and brood sows should contain 20 to 25 milligrams of niacin per pounds of supplement. Pigs fed on green pastures get plenty of

B^2 vitamins from the succulent forage.

Rather recently there has been a great deal of research to study the value of some of the sulfa drugs in the treatment of enteritis and dysentery in swine. Sulfaguanidine, sulfathalidine and sulfasuxidine have been used with considerable success. Some of the most extensive observations on using sulfathalidine to treat affected pigs under field conditions have been made by Dr. R. Graham and associates at the Illinois Experiment Station.

Almost 89 per cent of the pigs affected with clinical enteritis made satisfactory recoveries when treated with sulfathalidine. About 11 per cent of the affected pigs either remained unthrifty or died. In the same herds only 44 per cent of the untreated made satisfactory recoveries and 56 per cent either survived in an unthrifty condition or died. When the enteritis was accompanied by pneumonia about 82 per cent of the pigs died in both the treated and the untreated groups.

The Illinois workers also treated over 500 apparently healthy animals with sulfathalidine in herds where enteritis outbreaks had occurred. Only four per cent of the animals either became unthrifty or died, while 96 per cent of them remained healthy.

These results show that sulfathalidine is effective in the control and treatment of enteritis in swine when it is not complicated with pneumonia. It also has merit in preventing enteritis when given to apparently healthy animals in herds affected with the disease.

Since an overdosage of certain sulfa drugs may be dangerous to the pigs, your local veterinarian should be consulted when an outbreak of enteritis appears in your herd. He will know how much should be fed to the pigs to be effective in treating the disease.

The question of the importance of an adequate ration, even when sulfa drugs are used in treating enteric swine, has not been thoroughly studied. Some observations have been made, of which only one will be related here. A competent veterinarian had treated a herd of pigs affected with enteritis and the pigs had shown marked improvement in about three or four days. After the sulfa drug was discontinued the enteritis recurred in a few days and the farmer summoned the veterinarian again. Before treating the pigs with the sulfa drug the second time, a careful check was made on the ration being fed. It was a ration which

was borderline or slightly low in essential B²-complex vitamins. The ration was modified to be more adequate in these factors, sanitation was improved, and then the pigs were retreated with the sulfa drug. Recovery was rapid and no further difficulties developed. This observation emphasizes that feeding properly balanced rations is important along with sanitation in maintaining a healthful state after the sulfa drugs have enabled the animals to recover from the enteritis.

In summary, it has been demonstrated that enteritis in swine is solely a nutritional disorder. "Necro" may still be regarded as a bacterial disease and the ration fed may serve to prevent or permit the development of the organisms. Sanitary measures are recommended to hold this and other diseases in check, and this possibly may be as important in the control of "necro" as the discovery of the role of niacin. When a swine producer practices the four steps of the McLean County Swine Sanitation System he tends to prevent "necro" in his pigs, and at the same time he is using the best known method of controlling the roundworm. If an outbreak occurs the ration fed should be carefully checked for adequacy and sulfa drug administration as recommended by a veterinarian should be considered.

I believe in the dignity of labor, whether with head or hand, that the world owes no man a living but that it owes every man an opportunity to make a living.

John D. Rockefeller, Jr.

Delivering Bulk Feed to the Farm

Condensed from American Agriculturist

E. I. Robertson
Cornell University

"NO LIFT, no walk, no carry," might well be the slogan for the farm delivery of bulk feed recently started by E. T. Van Buren and Sons, Hobart, N. Y. Also, a saving of $4.00 a ton, as compared to sacked feed delivered to the farm, is a mighty big advantage to farmers using a lot of feed.

These feed men report that bulk feed makes a saving of about two hours in loading and unloading five tons of feed. The customers find another hour saved in untying bags and dumping the feed into the bin, plus the saving by preventing losses due to sack damage.

Bulk feed delivery to dairymen has been increasing in volume since the practice was started in December, 1946. Arthur Van Buren says he got the idea from talking to another feed man and from studying the delivery of coal which they handle. During February, 1947, the first full month that a dump truck equipped with a hoist was available, bulk feed deliveries accounted for about 10 per cent of the volume of feed.

Delivery of bulk feed requires a sturdy barn floor with the feed bins underneath. The overshot barns throughout Delaware County, N. Y., are very suitable for this type of feed delivery. Larger feeders have more advantage in bulk delivery, since a full load of feed can be delivered each trip. Many farms with the barn floor well supported and with feed bins underneath can be changed to permit the delivery of bulk feed. A hole cut in the floor into which the feed is dumped is all that is needed. Where horses are used in haying, the opening in the barn floor should be near the edge rather than the center of the driveway to prevent danger to the horses. However, if haying is done mechanically, the intake opening can be in the center where it is easy to get the trucks over it to allow the feed to flow into the bins by gravity.

"That's a lot easier than struggling with bagged feed," was the comment of one of the hired men as we watched 5 tons of dairy feed flow into the feed bin on the Donald Gould farm. About 10 minutes was required to dump

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the load and sweep out the truck and around the intake. Less time would have been required if both trap doors on the truck could have been opened. No separation of the feed occurred, as it fell such a short distance.

The idea of bulk feed delivery to the farm has much to commend it. It takes much of the labor out of getting feed on the farm. The investment in bags is avoided. Furthermore, all the time and inconvenience of sorting sacks to send them back to the mill are saved. Bulk feed delivery permits handling feed mechanically and takes a lot of the "lift, walk and carry" out of the feeding operations.

Search for Hardier Corn

Corn Belt farmers may some day have varieties that will take more punishment from insects and diseases than any now available. Iowa State College scientists, at a research center in Guatemala, Central America, hope to produce pest-resistant varieties that may be combined with high-yielding hybrids now grown in the Middle West.

They have collected more than 1,000 varieties in Mexico, United States, Central America and the West Indies for comparative tests. These include many new and little-known types. Some have stronger root systems than any corn now grown in this country.

Head of the center, which is located in a fertile valley at 5,000 feet, is I. E. Melhus, college botanist, who feels this is one of the best spots in the world to do plant research. Tropical and temperate zone crops may be grown the year around at the station. Two corn plantings a year are made. Seventy-five miles away on the Pacific coastal area three plantings a year are possible. There are five substations around the center at Amtigua to take advantage of the different growing conditions.

There is evidence that corn, beans, tomatoes and potatoes are native to the area, but Iowa research is centered on corn. Rootworms, borers and other corn insects are numerous. The heavy population affords opportunity to select plants with desirable qualities of resistance.

The program may be expanded later to include investigations with forage crops and trees that might prove adapted in the Middle West.

Capper's Farmer

Artificial Control of Egg Production

Condensed from Farm Research

G. O. Hall

Ithaca

THE normal distribution of egg production in the domestic fowl can be changed by artificial means. Poultrymen and experiment station workers have reported many attempts to influence the normal distribution of egg production to increase economic returns. This has been designated as *forced molting*. It is almost a universal practice among poultrymen to use artificial illumination on their laying birds through the fall and winter months.

In this study, restricted feeding, and restricted feeding combined with restricted lighting, were tested as means for the artificial control of egg production during the summer months and the effects of such controls on fertility, hatchability, and egg production during the fall months. Three pens of 30 birds each of high-producing, 2-year-old, Single Comb White Leghorns were used each year over a 3-year period. Observations were taken over three periods of 7 months each from June 1 to January 31, during the years 1943 to 1946. Records were kept of changes in body weight, molting, feed consumption, egg production, fertility, and hatchability.

Each year the 90 Leghorn hens in their second laying year, all in laying condition as determined by physical examination, were selected and divided at random into three equal groups. These hens were all of superior laying ability, each having produced a minimum of 200 eggs during the first year of production. They were placed in 12 x 14-foot pens in a well insulated, open-front, shed-roof, laying house on May 25, and the experiment began on June 1 each year.

The management of the birds in each of the three pens was as follows:

Pen A. — This was the restricted-feeding pen. The birds were fasted for 2 days at the beginning of each trial, and then fed grain in hoppers until August 16. During 1945—46 the grain was restricted further by feeding a definite amount each day. One per cent of cod-liver oil was added to the grain.

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Pen B. — The feeding schedule in this pen was the same as in pen A during the first 2 years. Feed was not restricted the third year. In addition, all daylight was excluded and the pen was ventilated by a system of baffle flues and the use of an electric fan. The only light to which the birds had access from June 1 to August 16 was exposure to a 60-watt bulb through a 6-inch square of Corning H. R. Lantern Blue B glass polished filter, which lighted the pen only enough so the birds could see to eat and drink. The time of exposure was from 8:00 a. m. to 4:00 p. m. daily. In this pen both restricted feeding and restricted light were used to control egg production.

Pen C. — This pen served as the control in which the routine management for maintaining in practice at the station at Ithaca summer and fall egg production was followed.

On August 16 all pens were placed on identical feed and management. The laying mash was replaced with a breeded mash. On September 1, two males were placed in each pen and rotated twice weekly for the duration of the experiment. Eggs were saved for 1 week out of each month, beginning in September, and incubated in a forced-draft incubator. Complete records of fertility and hatchability were obtained.

Results of the Tests

The results during the three trials have been remarkably consistent from year to year. In pen A, restricted feeding, and pen B, restricted feeding and lighting, there was a marked decline in body weight. In July 1944 the birds in pen B had lost 566 grams per bird, or a decrease of approximately 27 per cent in the original average weight. Loss in weight was fully regained.

In pen A, the molt was slow and erratic. In pen B, the molt was both rapid and complete. In pen C, the control, there was little or no molting until relatively late in the fall. The molt was a good index of the reproductive condition of the birds at all times during the experiment.

Mortality was relatively high in all pens, The lowest mortality occurred in pen B.

TABLE 1. — NUMBER AND VALUE OF EGGS PRODUCED

Year	PEN A*		PEN B*		PEN C*	
	No.	Value	No.	Value	No.	Value
1943-44	1,675	$69.12	2,382	$ 99.90	2,230	$ 91.15
1944-45	1,923	79.34	2,247	95.58	2,601	101.51
1945-46	1,854	73.35	3,012	119.74	2,758	104.19

*Pen A, restricted feed; pen B, restricted feed and light; pen C, control.

TABLE 2. — FERTILITY AND HATCHABILITY, SEPTEMBER TO JANUARY, 1943-44, 1944-45, AND 1945-46, 3-YEAR AVERAGE

Group*	No. of Eggs	No. Infertile	Percentage Infertile	No. of Chicks	Percentage Hatchability Total Eggs	Percentage Hatchability Fertile Eggs
Pen A	247	73	29.6	137	55.5	78.7
Pen B	438	96	21.9	248	56.6	72.5
Pen C	207	98	47.3	69	33.3	63.3

*Pen A, restricted feed; pen B, restricted feed and light; pen C, control.

SOIL CONSERVATION BULLETINS

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To Hold This Soil — Misc. Publication 321 ..... 45¢

Soil Conservation Survey Handbook — Misc. Publication, 352 ..... 20¢

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Order by name and number from the Department of Extension Teaching and Information, New York State College of Agriculture, Ithaca, N. Y.

The Story of Fertilizer

Condensed from Fertilizer Review

A NOMADIC tribe of Chilean Indians in a long and fruitless search of a new hunting ground, were once overtaken by night in a plateau desert. They built a small fire to cook food. Soon that fire started to creep through the ground, making strange hissing noises, emitting a strange smoke and odor. The superstitious Indians noted what was happening and fled into the night with cries of fright. Their wise men informed them that they had stumbled on an area inhabited exclusively by evil spirits.

The chief of the tribe immediately dispatched his son to carry the news to a missionary. The padre received the news of the evil spirits with ill-concealed disbelief. He set out on a personal tour of investigation the very next day. He brought back with him some of the deposits, examined them in crude laboratory apparatus, pronounced them as containing heavy proportions of nitrate of soda.

The incident was forgotten until one morning the padre discovered that one row of his kitchen garden crops was much taller and more robust than the other. Then he remembered that the caliche which he had not used in his experiments had been thrown out in the garden. As a result of this discovery, he was able to announce to the Indians that the desert, instead of being inhabited by evil spirits, was really a gift from Heaven.

The influence of the padre was immeasurably increased when the Indians, unable to find better hunting grounds, turned to the raising of crops, using the caliche to renew the one-time fertility of their soil, and were thus saved from starvation.

The padre and his pastoral parishioners discovered a great truth long years before it became known to the rest of the world, and took advantage of it.

The area in Chile where most of our nitrate was found, up to 1930, was on a barren plateau in the Andes mountains, about 450 miles long and 90 miles in width. The layers of caliche are found about three feet beneath the surface and vary in richness from 5 to 70 per cent of sodium nitrate.

Modern processing equipment, largely American in design. recovers about 90 per cent of the nitrate in the ore, as compared with the 55 per cent under less efficient operation.

As found on the market, Chilean nitrate of soda is now usually pure white in color.

Reprinted by permission from Fertilizer Review, Washington, D. C., March-April, 1947

The name of the priest who wasn't fooled by the talk about evil spirits, the man whose alert mind readily grasped the idea that nitrate of soda had the ability to improve crops, is lost to history. The world, however, owes him a debt of gratitude.

As late as 1830, however, nitrate of soda was almost unknown in this country and its utility was such a mystery that when a sailing ship from Chile docked in New York harbor, and the cargo included a ton of nitrate, no one was able to set a value on it. Consequently, it was unceremoniously dumped in the harbor.

Scientific men, farmers hungry for a better fertilizer and manufacturers sincerely anxious to serve farmers, were eventually destined to find the answers. It was to prove a long, tedious trial that was to start in Germany, continue to Great Britain, and, eventually, end in the New World with its vast acreage, its latent productiveness.

What "Hen Pecked" Means

Condensed from Kansas Farmer

A. M. Guhl

Kansas State College

Did you know that barnyard fowls have a definite social organization? At Kansas State College studies are being made of the social life in flocks of hens.

Chickens are aggressive fowls. This is readily seen when 2 hens compete for food. One may give the other a stout peck on the head and win the right to feed first. If hens are marked with colored legbands for identification the pecks can be recorded as to which hen pecks which.

By this method it has been found that the hens in a flock can be arranged into a peck-order. Records of pecking in small flocks have shown that one hen pecks all in her group without being pecked in return, another is pecked by all and pecks none. Other hens in the pen can be placed between these 2 in accordance with the number each pecks.

At first thought such a social order appears to be savage. It isn't. Just watch a small flock of hens. They usually appear to be

Reprinted by permission from the Kansas Farmer, Topeka, Kansas, September 15, 1945

peaceful and more or less content. It is the peck-order that makes this possible. Each hen has learned which ones she may peck, and which she must avoid.

As the birds become well acquainted, the dominating hens do not need to peck to have the right-of-way. Their subordinates give way to them. The result is that in well-managed flocks there is comparatively little pecking. This is easily demonstrated. If one places a number of strange hens together, there is much hard fighting. The winner of each fight can therafter dominate the loser, which must give way to avoid being attacked.

Pecks become less frequent among hens as they learn how to behave toward one another. Mixing flocks after culling is always disturbing as the new comers must establish themselves in a social order.

Although a flock may appear to be peaceful because there is little pecking, or at least no fighting, it does not follow that all hens fare equally well. It has been found that boss hens have a freedom to range and to feed whenever they have the urge to do so. In contrast, hens at the bottom of the peck order are more molested and have less opportunity to feed.

These differences at the extremes of the social order are reflected in the fact that the top birds lay more eggs than those at the bottom of the flock organization. It is known from experiment that the individuals in a flock of acquainted hens with a smooth working peck order, peck each other less frequently, consume more food, maintain body weight and lay more eggs than those in a flock which is kept from developing a peck-order.

It is obvious that it would pay a poultryman to manage his flocks so as to reduce hen-to-hen competition. Adding hens to a well-established flock may cause these strangers to be at the bottom of the peck-order, and consequently go out of production.

If we add males to the social life in a flock the story becomes more complicated. But before we come to that, let us consider a group of males in the absence of hens.

Cocks are more aggressive than hens. Fights between them are rather common. When they first meet in a pen as strangers the fights are severe. These usually bloody battles may be prolonged and repeated. After a series of struggles a peck-order is formed, but the social tension among them is more pronounced than among hens. When a cock loses a fight he does not entirely lose heart. He may threaten his superior. As a result the peck-

order of the cocks may change occasionally.

A cock behaves differently towards a hen than towards a fellow male. Although he dominates the hens he normally does not peck them. Males differ somewhat in their behavior towards the females. Some are very gentle and others quite rough. In general, hens learn that a cock will not peck them and therefore do not avoid him, unless he gives them too much attention.

A cock struts among the hens making gestures to this or that hen, apparently in search of a responsive mate. If he is unsuccessful he may resort to other methods of attracting the attention of the hens. Typical among these is the "food call." He may scratch in the ground while calling the hens to some fictitious morsel. Hens respond to this call. A gallant cock actually may find some food and then permit the hens to feed.

Experiments in using one male in a pen of hens have proved there is no equality among the hens as to the number of times each is mated. Some hens will not mate with a given cock, although they may do so readily with another. If several cocks are used singly and alternately with the same group of hens, one finds a different mating order (based on the frequency of mating) with each male. That is, the individual hens may mate at different rates with each cock.

Poultry men have called this "preferential mating," which means non-random mating. Apparently, there are differences in the compatibility between a male and each of the hens. But this is not the whole story.

Since the boss birds in the flock are known to have certain benefits over those in the peck-order, one may expect the bosses to possess some advantages during mating activities. However, careful observations have not shown any signs of competition between hens for the attention of the male. Hens pay little or no attention when one of them is mated. The rate at which the hens are mated bears no direct relation to their social position in the social order. The situation among the cocks, however, is strikingly different from that among the hens.

It is a common practice to keep more than one cock in the pen of a mating flock. The number of males used varies with the number of hens in the flock. Poultrymen recommend a certain ratio of males to females for light and heavy breeds. The procedure also serves as a corrective for "preferential mating." It is believed that a hen which refused to mate with one of these males will do

so with another. Let's see what happens by way of social behavior under these conditions.

You will recall that males have a peck order apart from that among the hens. In mating flocks there are 2 social orders, one among the males and another among the females. In contrast with the hens, the cocks compete for mates.

These reactions are most pronounced when the males are first placed with the hens. The boss among the males attacks any male which either courts or mates with a hen. If there are several cocks, each will attack those inferior to him, so that the male at the bottom of the male peck-order is suppressed in his mating behavior.

There have been incidences in which the most inferior male was kept from mating and also from displaying any attention to the hens. Under such conditions he was ineffective as far as reproduction is concerned. In a large, uncrowded pen the tension is reduced but in all flocks studied the highest ranking male did most of the mating. Too many cocks in a pen increases fighting and interferes with mating. Hens avoid fighting males.

In recent experiments these observations were carried one step further. Behavior of the cocks suggested that social position may have some bearing on the number of chicks a male may sire. Three cocks were used that differed from the hens, and from each other, in one hereditary character. All eggs were incubated. Since the particular hereditary trait of the male appeared in his offspring it was possible to determine the sire of each chick. In these flocks it was found that the top male had the most offspring, and the bottom one the fewest.

These results indicate that fecundity is higher at the top of the social organization in a flock of chickens than at the bottom. Poultrymen are always interested in methods for improvment in flock management which may lead to increased egg production and fertility. One may not be too optimistic in believing that further experimentation along these lines may develop some helpful suggestions.

Calcium vs. Magnesia in Agricultural Lime

Condensed from Pennsylvania Farmer

J. B. R. Dickey
Pennsylvania State College

THE old question as to which is better, burned lime or ground raw limestone, seems eventually to have been pretty well settled through the general use of the latter by farmers. There are still lime questions, however, which seem to need some discussion. In years gone by there was something of a prejudice against limes which carried a high percentage of magnesia and the manufacturer who had such lime was apt to act as if he were more or less ashamed of the fact. More recently certain plant troubles have been traced to a deficiency of magnesia in the soil, so that there is now a tendency for the magnesia lime salesman to boast about the superiority of his product on account of the magnesia.

All lime and limestone contains some magnesia, but a high calcium lime may carry only a small percentage of magnesia. Other limestone may be as much as two-fifths magnesia and three-fifths calcium. Such limestone is known as "dolomite." For many purposes a high calcium limestone is preferable if not essential. It is used for "furnace stone" in smelting iron and wherever a lime is desired which will slake quickly with plenty of heat and swelling. A dolomite lime will slake more gradually and mortar made from it will not set as quickly, so that it is easier to work with. Most of the "ground burned" lime sold in sacks for agricultural use was dolomitic, since a high calcium lime was apt to take up enough moisture to slake, swell and burst the sacks before it could be used.

Calcium and magnesia are similar minerals. Both will correct soil acidity, which is the principal use of lime on the land. Magnesia is the stronger base and 100 pounds of magnesia will neutralize as much acid as 138 pounds of calcium. In some states this higher neutralizing ability is given credit in figuring analyses for agricultural purposes, and expressed as "calcium oxide, or calcium carbonate, equivalent." Experiments at Pennsylvania State College with high calcium

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and high magnesium hydrated limes and pulverized lime stones, however, showed no appreciable difference in their value pound for pound; so that we simply add the calcium and magnesia together and call it total oxide or total carbonate. In Pennsylvania the guaranteed analysis is expressed as oxide, the form in which the calcium and magnesia occur in burned lime. A good ground limestone should run 50 to 55 per cent total oxide; hydrated lime should run 65 to 75 per cent; and burned lime, if well burned, made from good stone, fresh and unslaked should run over 90 per cent, though "ground burned lime" often runs much lower. These percentages give one an idea as to the relative strengths of the principal forms of lime.

Probably the reason we did not get relatively better results from the dolomite lime products in our experiments, in spite of their higher theoretical value for neutralizing acidity, was because they were slower in their action in the soil just as they are slower to slake. We know that the finer a form of lime the greater the immediate effect and the more quickly it all goes into solution. Old farmers said that unless one could make dust fly when spreading lime it was not worth spreading. The finer the particles the more surface there is exposed to the action of soil acids and the more particles of lime there are in contact with particles of soil.

Lime does not dissolve in water and move around in the soil. It must be dissolved by the soil acids in order to neutralize them, and to do so it must come into contact with them. The better it is mixed with the soil the better and quicker will be the results. If dolomitic limestone is slower in dissolving that high calcium limestone it would seem desirable that a high magnesian stone should be pretty finely pulverized if we are to get good immediate results from moderate applications. The statement is often made that it probably does not pay to grind limestone finer than necessary to have it pass through a screen with 20 wires to the linear inch (20 mesh). However, it is always specified that limestone should contain all the fine dust produced in grinding if we are to get good results from moderate applications.

Some large quarries, producing limestone for industrial purposes, wash the stone after it goes through the crushers. The wash water is sometimes held in a settling basis to keep as much as possible of the sediment out of streams. The material from the settling basin is dredged out and sometimes sold to farmers as agri-

cultural limestone. It is damp, so it cannot be spread with the common lime drill but it works well in manure spreaders and the endgate, spinner type of spreader. The fact that there is no troublesome dust, some of which blows over on to the next farm, is often mentioned. There is some valueless soil which stuck to the quarry stone, but most of it is limestone and the analysis is fairly satisfactory. The price at the plant is seldom much over a dollar per ton. Operators of spreader trucks can often make an attractive price to farmers spread on the land. When shipped it is loaded on hopper bottom, open cars and dumped or elevated into trucks with no hand labor involved. If one can buy this sort of material on a spread basis, at a price which permits applications of several tons per acre it seems like a good buy, but there are some things to consider.

While there is no coarse material in limestone produced as above, neither is there much of any of the very fine dust in most of it. The dust was carried on by the water in some cases, or settled only in the lower end of the basin in others. The stuff from the lower end may be so fine that it cakes into mud balls when handled and is almost impossible to spread satisfactorily. The material from the part of the basin where settling first took place is in the nature of a very fine sand, with practically no dust. Most of it may pass a 100-mesh screen, but it still does not compare in fineness with most of the pulverized limestone which farmers found from experience gave them satisfactory clover with moderate applications.

Another thing to consider regarding washery limestone is that much is produced from dolomitic stone. In view of the slower action of high magnesium limestone it would seem that if such material was rather low in fine particles it might be necessary, or at least wise, to make applications quite liberal and perhaps also to make them a year or more before the clover or alfalfa seeding was made. Every one is interested in new sources of material for neutralizing soil acidity, especially if they are cheap enough per ton to permit liberal application. It is still up to the farmer, however, to know and understand what he is getting and to use it accordingly.

In regard to deficiencies of magnesia in the soil, the symptoms of this are pretty well recognized, and at least until the past season they have rarely been reported in Pennsylvania. Magnesia deficiencies affect mainly such crops as cotton and tobacco and mainly on the sandier soil of the coastal plain. Deficiencies

also have developed in the case of potatoes, truck crops and fruit. They are more apt to occur in very wet seasons which leach out the soluble magnesia. Heavy use of nitrogenous fertilizers, especially on unlimed acid soils seems to increase the trouble. If farmers continue to increase the application of fertilizers high in such things as sulphate of ammonia on potatoes, magnesia deficiencies may appear, especially on the lighter soils and in seasons of heavy rainfall.

Lack of enough magnesia in the soil can be taken care of by adding salts of magnesia to the fertilizer or by the use of dolomitic lime products. If one were liming a very acid soil in a potato rotation it might be well to use a high magnesia lime or pulverized limestone, but it would be wise to keep the amount small and in a readily available form to reduce the danger of scab. All lime contains some magnesia and the amount required for plant nutrition is relatively small. Some farmers, where both high calcium and dolomitic limes were available, used to think that after using one sort for a while they got better results from changing to the other. There may have been something to this, as there is to so many of these old ideas. It may be possible to get too much magnesia in the soil in relation to calcium; many of these things are a matter of proper balance between two elements. We certainly cannot discriminate against dolomitic material for agriculture if it is wisely used. Under some conditions, as indicated above, it may be preferable. As in so many cases it is a case of the farmer understanding what he has to work with and using his head to adapt his tools to the needs of each particular case as best he can.

The Compleat Angler

O more than happy countryman if only he knew his good fortune.

Virgil

FOR THE FARMER'S LIBRARY

A Living from Bees—By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. $2.25.

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean, School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $3.50.

Bovine Mastitis — A Symposium — Edited by Ralph B. Little, Dept. of Animal and Plant Pathology, The Rockefeller Institute for Medical Research, and Wayne N. Plastridge, Dept. of Animal Diseases, Univ. of Connecticut. McGraw-Hill Book Co., Inc. $7.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers. $2.50.

Breeds of Livestock in America—By Henry W. Vaughan, formerly Prof. of Animal Husbandry, Iowa State College. College Book Co. $4.75.

Dairy Cattle Feeding and Management—3rd Edition—By H. O. Henderson, Prof. of Dairy Husbandry, W. Va. Univ., Carl W. Larson and Fred S. Putney. John Wiley & Sons, Inc. $4.50.

Dairy Science—By W. E. Petersen, Ph.D., Assoc. Prof. Dairy Husbandry, Univ. of Minn. By R. W. Gregory. J. B. Lippincott Co. $4.00.

Diseases and Parasites of Poultry — By Edgar Hugh Barger, D. V. M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition. $3.75.

Domestic Geese and Ducks—By Paul P. Ives, Pres. Am. Waterfowl Ass'n. Orange Judd Publishing Co., Inc. $3.50

Elements of Soil Conservation—By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Dept. Agric. McGraw-Hill Book Co., Inc. $3.20.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.50.

Farmers of the World—The Development of Agri. Extension—edited by Edmund deS. Brunner, I. T. Sanders, Douglas Ensminger. Columbia Univ. Press (1945). $2.50.

Farm Records—by John A. Hopkins, Ph.D., Asso. Prof. Economics, Iowa State College. Iowa State College Press. $3.00.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $6.00.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. $3.50.

Grow Your Own Fruit—By M. G. Kains, formerly U. S. Dept. of Agri.; Prof.of Horticulture, Penna. State College, Greenberg, Publisher. $3.50.

Hatchery Management — By Roland C. Hartman, Editor, Everybody's Poultry Magazine, and G. S. Vickers, Field Mgr., Ohio Poultry Improvement Asso. Orange Judd Publishing Co., Inc. $4.00.

How to Raise Rabbits for Food and Fur—By Frank G. Ashbrook, Fish and Wildlife Service, U. S. Dept of the Interior. Orange Judd Publishing Co., Inc. $2.00.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $3.00.

Livestock Production—By Walter H. Peters, Chief, Div. of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $4.00.

Livestock Judging Handbook — By Julius E. Nordby and W. Malcolm Beeson, Ph.D., Asst. Professors Animal Husb., Univ. Idaho. The Interstate Printers. $3.25.

Making Pigeons Pay—By Wendell M. Levi, formerly Pigeon Section, U.S.D.A. Signal Corps. Orange Judd Publishing Co., Inc. (1946) $2.50.

Modern Agricultural Mathematics—By Maurice Nadler, B. S., A. M., Dept of Mathematics, Newtown High School, Long Island. Orange Judd Publishing Co., Inc. $2.00.

Modern Farmers' Cyclopedia of Agriculture—By Earley Vernon Wilcox Ph.D., formerly U. S. Dept. of Agri. Orange Judd Pub. Co., Inc. $4.50.

Natural Principles of Land Use—By Edw. H. Graham, Chief of Biology Div., Soil Conservation Service. Oxford University Press. $3.50.

Pay Dirt—Farming and Gardening with Composts—By J. I. Rodale. Devin-Adair Co. (1945). $3.00.

Pork Production — By William W. Smith, Prof. of Animal Husbandry Purdue Univ. The Macmillan Co. $4.15.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry. Mo. State Univ. J. B. Lippincott Co. $5.00.

Practical Farming for the South — By Benjamin F. Bullock, now Prof. Rural Education, Atlanta Univ. Univ. of North Carolina Press. $2.50.

Profitable Poultry Keeping—By H. Clyde Knandel, Head, Dept. Poultry Husb., Penn State College. Orange Judd Publishing Co., Inc. $3.00.

Raising Livestock—By Walter H. Peters, Chief, Div. of Animal and Poultry Husbandry, Univ. of Minn., and George P. Deyoe, Prof. of Education, Mich. State College. McGraw-Hill Book Co., Inc. $3.50.

Raising Turkeys, Ducks, Geese, Game Birds—By Morley A. Jull, Prof. and Head of Poultry Dept., Univ. of Md. McGraw-Hill Book Co., Inc. $3.75.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue Univ. The Interstate Printers & Publishers. $2.25.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.50.

Soil Conservation—By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Dept. of Agric. McGraw-Hill Book Co., Inc. $6.50.

Starting Right with Turkeys—By G. T. Klein, Extension Poultryman, Mass. State College; edited by Ed. Robinson. The Macmillan Co. (1946). $2.50.

Successful Poultry Management—By Morley A. Jull, Professor and Head of Poultry Dept., Univ. of Maryland. McGraw-Hill Book Co., Inc. $3.50.

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NEW BOOKS

LAND FOR THE FAMILY—A Guide to Country Living. A. F. Gustafson, E. V. Hardenburg, E. Y. Smith, of the New York State College of Agriculture, and Jeanette B. McCay, formerly of the New York State College of Home Economics, at Cornell University. Comstock Publishing Co., Inc. 1947. 487 pp. $4.00.

This book is designed primarily for those who are planning a home in the country which they hope to make self sufficient, but it will also be of value to those who are experienced in country living. Practically every phase of rural life is considered. Selecting and buying a home; managing the soil; choosing the crops to grow; flower, vegetable, and fruit growing; production of livestock and poultry; butchering; and managing the woodlot; are discussed in detail with an analysis of the cost involved. A bibliography is given on each subject. An excellent section on home economics is included which discusses the needed equipment for the country kitchen, and gives directions and charts for canning, freezing, and drying foods. The book is well planned, its information definite, its directions explicit.

THE GARDENER'S BUG BOOK—Cynthia Westcott. Edited by F. F. Rockwell. The American Garden Guild, Inc. and Doubleday and Co., Inc. 1946. $4.95. 539 pp.

Cynthia Westcott has compiled a practical manual on the control of garden pests which is the result of many years of practice and much careful study. A brief history is given on each of 1000 insect pests, a full description of them in every stage of their life cycle, the plants attacked, the type of injury done, and control measures. The text is simply written and directions specific. A large number of excellent illustrations aid in the identification of pests. Spraying, dusting, fumigation, the kinds of garden chemicals, and how and when to use them, are discussed in detail. The book is so planned and indexed that it is very easy to find the desired information.

JESSE BUEL—AGRICULTURAL REFORMER—Selections from His Writings. Edited with introduction by Harry J. Carmon, Columbia University Press. 1947. $6.75. 600 pp.

Jesse Buel, a farmer's son and printer by trade, became one of the country's leading figures in the field of agriculture in the early nineteenth century. He was among the first in this country to recognize the dependence of all people upon the farmer. He worked tirelessly to develop better farming methods, and to bring greater educational opportunities to farmers. Much of his writing, some of his addresses to agricultural societies, and his book, THE FARMER'S COMPANION, have been gathered together in one volume by the Columbia University Studies in the History of American Agriculture. The book is tremendously interesting as it gives a valuable picture of the progress made in scientific farming, much of it initiated by Jesse Buel.